Subject Categories of the Division F. Life Sciences

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Subject Categories of the Division G. Mathematical and Computer Sciences

Select a category to view the collection of records cited. N.A. means no abstracts in that category.

19980003947 National Inst. of Environmental Health Sciences, National Toxicology Program, Research Triangle Park, NC USA
Reproductive Toxicity of Lead Acetate Trihydrate (CAS No. 6080-56-4) Administered in Drinking Water to Sprague-Dawley Rats ***Final Report***
Oct. 31, 1996; 417p; In English
Report No.(s): PB97-125371; RACB-94009; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The potential effects of lead acetate trihydrate on the Sprague-Dawley rat reproductive system was evaluated. Phase 1, the Pilot Study, was conducted to confirm similarities of response across laboratories. Phase 2, the Main Study, was conducted to determine if rats acclimatize to some of the effects of lead over a 6-month time frame. For Phase 1, twenty-six male and sixteen female Sprague-Dawley rats/group were administered 0 or 0.3% lead acetate trihydrate in the drinking water for at least 28 days. Clinical observations, body weights, feed and water consumption data were collected. For Phase 2, four hundred male and four hundred female Sprague-Dawley rats were administered 0, 0.025, 0.05, 0.1, and 0.3% lead acetate trihydrate in the drinking water for up to six months. Body weights, food consumption, and water consumption were measured during Study Weeks 1, 4, 8, 12, 16, 20, and 24.
NTIS
Potable Water; Lead Acetates; Reproductive Systems; Toxicity; Reproduction (Biology); Biological Effects

19980004629 NASA Johnson Space Center, Houston, TX USA
Development of an Antimicrobial Susceptibility Testing Method Suitable for Performing During Space Flight
Jorgensen, James H., Texas Univ. Health Science Center, USA; Skweres, Joyce A., Krug Life Sciences, Inc., USA; Mishra S. K., Krug Life Sciences, Inc., USA; McElmeel, M. Letticia, Texas Univ. Health Science Center, USA; Maher, Louise A., Texas Univ. Health Science Center, USA; Mulder, Ross, bioMerieux Vitek, Inc., USA; Lancaster, Michael V., Centers for Disease Control, USA; Pierson, Duane L., NASA Johnson Space Center, USA; 1997; 21p; In English
Report No.(s): NASA/CR-97-112973; NAS 1.26:112973; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Very little is known regarding the affects of the microgravity environment of space flight upon the action of antimicrobial agents on bacterial pathogens. This study was undertaken to develop a simple method for conducting antibacterial susceptibility tests during a Space Shuttle mission. Specially prepared susceptibility test research cards (bioMerieux Vitek, Hazelwood, MO) were designed to include 6-11 serial two-fold dilutions of 14 antimicrobial agents, including penicillins, cephalosporins, a Beta-lactamase inhibitor, vancomycin, erythromycin, tetracycline, gentamicin, ciprofloxacin, and trimethoprim/sulfamethoxazole. Minimal inhibitory concentrations (MICS) of the drugs were determined by visual reading of color endpoints in the Vitek research cards made possible by incorporation of a colorimetric growth indicator (alamarBlue(Trademark), Accumed International, Westlake, OH). This study has demonstrated reproducible susceptibility results when testing isolates of Staphylococcus aurezis, Group A Streptococcus, Enterococcusfaecalis, Escherichia coli (beta-lactamase positive and negative strains), Klebsiella pneumoniae, Enterobacter cloacae, and Pseudomoiias aeruginosa. In some instances, the MICs were comparable to those determined using a standard broth microdilution method, while in some cases the unique test media and format yielded slightly different values, that were themselves reproducible. The proposed in-flight experiment will include inoculation of the Vitek cards on the ground prior to launch of the Space Shuttle, storage of inoculated cards at refrigeration temperature aboard the Space Shuttle until experiment initiation, then incubation of the cards for 18-48 h prior to visual interpretation of MICs by the mission's astronauts. Ground-based studies have shown reproducible MICs following storage of inoculated cards for 7 days at 4-8 C to accommodate the mission's time schedule and the astronauts' activities. For comparison, ground-based control (normal gravity) MIC values will be generated by simultaneous inoculation and incubation of a second set of test cards in a laboratory at the launch site. This procedure can provide a safe and compact experiment that should yield new information on the affects of microgravity on the biological activities of various classes of antibiotics.
Author
Bacteria; Pathogens; Microgravity; Antiinfectives and Antibacterials; Spaceborne Experiments; Space Missions; Antibiotics; Staphylococcus; Streptococcus; Tetracyclines

19980004666 Texas Univ. Health Science Center, Baromedical Lab., Houston, TX USA
Study of Hind Limb Tissue Gas Phase Formation in Response to Suspended Adynamia and Hypokinesia ***Final Report***
Butler, Bruce D., Texas Univ. Health Science Center, USA; 1996; 40p; In English
Contract(s)/Grant(s): NCC9-20

Report No.(s): NASA/CR-97-206457; NAS 1.26:206457; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The purpose of this study was to investigate the hypothesis that reduced joint/muscle activity (hypo kinesia) as well as reduced or null loading of limbs (adynamia) in gravity would result in reduced decompression-induced gas phase and symptoms of decompression sickness (DCS). Finding a correlation between the two phenomena would correspond to the proposed reduction in tissue gas phase formation in astronauts undergoing decompression during extravehicular activity (EVA) in microgravity. The observation may further explain the reported low incidence of DCS in space.

Author

Decompression Sickness; Microgravity; Hypokinesia; Muscular Function; Hemodynamic Responses; Weightlessness Simulation

19980004667 California Univ., Office of the Vice Chancellor for Research, Davis, CA USA

Effects of Centrifuge Diameter and Operation on Rodent Adaptation to Chronic Centrifugation ***Final Report***

Fuller, Charles A., California Univ., USA; 1997; 49p; In English

Contract(s)/Grant(s): NAG2-795

Report No.(s): NASA/CR-97-206479; NAS 1.26:206479; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This study examined the responses of rats to centrifugation in a constant acceleration field (1.5 G). Centrifuge diameter (1.8m, 2.5m or 6.0m) and schedule of operation (Daily or weekly stop) varied between groups. Body mass, food consumption, water consumption and neurovestibular function were measured weekly. Body temperature and activity were continuously monitored using telemetry. A subset of subjects were videotaped (50 minutes per day) to allow for movement analysis. Exposure to a hyperdynamic field of this magnitude did cause the expected depression in the physiological variables monitored. Recovery was accomplished within a relatively rapid time frame; all variables returned to precentrifugation levels. In general, the magnitudes of the changes and the rate of recovery were similar at different centrifuge diameters and stopping frequency. There were cases, however, in which the magnitude of the response and/or the rate of recovery to a new steady-state were altered as a result of centrifuge diameter. In summary, these results indicate that stopping frequency has little, if any, effect on adaptation to chronic centrifugation. However, the angular velocity (omega), and therefore centrifuge diameter is an important consideration in the adaptation of an organism to chronic centrifugation.

Derived from text

Physiological Responses; Rodents; Body Temperature; Food Intake; Water Consumption; Telemetry; Centrifuging; Body Fluids

19980004717 Department of Health and Human Services, Public Health Service, Research Triangle Park, NC USA

Toxicology and Carcinogenesis Studies of Tetrafluoroethylene (CAS No. 116-14-3) in F344/N Rats and B6C3F1 Mice (Inhalation Studies), ***series***

Apr. 1997; 309p; In English

Report No.(s): PB97-208508; NIH/PUB-97-3366; NTP-TR-450; No Copyright; Avail: CASI; A14, Hardcopy; A03, Microfiche

Tetrafluoroethylene is used in the production of polytetrafluoroethylene (Teflon) and other polymers. Tetrafluoroethylene was nominated by the National Cancer Institute for toxicity and carcinogenicity studies based on the potential for human exposure to the chemical due to the large production volume and on the lack of adequate data for tetrafluoroethylene in the literature. Male and female F344/N rats and B6C3F1 mice were exposed to tetrafluoroethylene (98% to 99% pure) by whole body inhalation exposure for 16 days, 13 weeks, or 2 years. Genetic toxicity studies were conducted in mouse peripheral blood erythrocytes.

NTIS

Toxicity; Carcinogens

19980004908 Montana State Univ., Dept. of Microbiology, Bozeman, MT USA

Rapid Bacterial Testing for Spacecraft Water ***Final Report***

Lisle, John T., Montana State Univ., USA; Pyle, Barry H., Montana State Univ., USA; McFeters, Gordon A., Montana State Univ., USA; Oct. 1996; 22p; In English

Contract(s)/Grant(s): NAGw-5001

Report No.(s): NASA/CR-96-206364; NAS 1.26:206364; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Evaluations of the fluorogenic stains and probes will continue. E. coli 0157:H7 will be used as the reference strain for optimizing protocols. We anticipate the continued use of the fluorescent antibodies (TRITC and FITC labeled) in conjunction with CTC, Rhl23, DiBAC4(3), DAPI and acridine orange. Chemunex, the manufacturer of the ChemScan analyzer system, also makes a fluorogenic probe, Chemchrome B, which will be incorporated into the suite of probes to evaluate once their system is on site. Regardless of the combination of stains and probes all will be evaluated on membrane filters. Development of a FISH protocol that will be applicable to our conditions will be continued. Complimentary 16s rRNA probes to Ps. aeruginosa and currently in our laboratory will be evaluated first. Once this protocol has been adequately optimized other probes will be ordered for u a select

number of other species. Currently, protocols to evaluate the effects of disinfection and the resulting lethality, injury on stain and/or probe specificity and reliability are being developed. E. coli 0157:H7 is the reference strain and chlorine the disinfectant the reference protocol is being developed around. Upon completion of this work, the resulting protocol will be extended to other species and disinfectants (e.g., iodine). Similar disinfectant experiments will then be conducted on the same species after starvation to evaluate the effects of starvation on disinfection resistance and the applicability of the stains and probes. Development of the immunomagnetic separation system will continue. Combined with the rapid methods described above, with enumeration by the ChemScan, we anticipate that this will provide a highly sensitive technique for the detection of specific, active bacteria.
Derived from text
Bacteria; Water; Evaluation; Chlorine; Aerospace Vehicles

19980005232 ROW Sciences, Inc., Gaithersburg, MD USA
Reproductive Toxicity of Methacrylonitrile Administered in Diet to Sprague-Dawley Rats ***Final Report***
Wolfe, G. W., ROW Sciences, Inc., USA; Delaney, J. C., ROW Sciences, Inc., USA; May 16, 1997; 514p; In English
Report No.(s): PB97-176390; ROW-Sciences-8989-31; CAS-126-98-7; No Copyright; Avail: CASI; A22, Hardcopy; A04, Microfiche

The potential reproductive toxicity of methacrylonitrile in Sprague-Dawley rats was evaluated using the Reproductive Assessment by Continuous Breeding (RACB) protocol. Based on decreased body weights and feed consumption, increased water consumption, and mortality noted during Task 1, dose levels for the continuous breeding phase for the study were set at 2, 7, and 20 mg/kg in deionized water by oral gavage. Exposure to methacrylonitrile by gavage (20 rats/sex/group) did not affect the reproductive performance of F0 rats (Task 2) or F1 rats (Task 4) where only the controls and high-dose groups were evaluated. In Task 4, estrous cyclicity of the F1 animals was not affected by methacrylonitrile administration. Slight but consistent decreases (3-6%) were noted in the 20 mg/kg F0 male body weights, although none of these reached statistical significance. F0 female body weights were unchanged. Body weights of the F1 20 mg/kg males and females were consistently less (6-10%) than controls and were occasionally statistically significant. Daily mean feed consumption was decreased by 8-11% in the 20 mg/kg F1 males; F0 male and female and F1 female feed consumption values were unchanged.
NTIS
Animals; Breeding (Reproduction); Deionization; Rats; Significance; Statistical Analysis; Toxicity

19980005358 NERAC, Inc., Tolland, CT USA
Microbiology of Groundwater (Latest citations from the Life Sciences Collection Database)
May 1996; In English; Page count unavailable
Report No.(s): PB96-870084; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the occurrence, distribution, activity, and movement of groundwater microorganisms. Detection of microorganisms and their effects upon groundwater quality are also considered.
NTIS
Bibliographies; Ground Water; Microbiology

19980005389 Hospital for Special Surgery, New York, NY USA
Studies of Intercellular Communication and Intracellular Metabolic Responses by Bone Cells to Simulated Weightlessness ***Final Report***
Doty, Stephen B., Hospital for Special Surgery, USA; Dec. 10, 1997; 17p; In English
Contract(s)/Grant(s): NCC2-655
Report No.(s): NASA/CR-97-206494; NAS 1.26:206494; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Spaceflight affects the weight bearing skeletal tissues by reducing the rate of new bone formation. This effect on the long bones of flown rats has been quantitated but the effect at the cellular level and the mechanism(s) involved are not understood. We are applying electron microscopy, coupled with histochemistry and immunocytochemistry to determine the cellular functions most affected by spaceflight. The emphasis for study of these samples from SLS-1, a 9-day mission, is on the histochemical and structural changes of the endosteal and perivascular osteoblasts found in diaphyseal bone of femur and tibia. Work is still in progress but some findings are described: (1) An expected decrease in alkaline phosphatase activity in osteoblasts from flight animals, but an increase in enzyme activity in the stromal stem cells adjacent to the osteoblast. (2) An increase in osteoclastic TRAP activity

in the trabecular bone region in response to spaceflight. (3) A large increase in procollagen containing secretory granules in osteoblasts in the recovery group, and a significant decrease in granule numbers in the flight group.
Author
Bones; Histochemical Analysis; Musculoskeletal System; Rats; Space Flight; Cytology; Enzyme Activity; Electron Microscopy

19980006143 Wisconsin Univ., Dept. of Horticulture, Madison, WI USA
Space Experiment on Tuber Development and Starch Accumulation for CELSS ***Final Report***
Tibbitts,Theodore W., Wisconsin Univ., USA; Croxdale, Judith C., Wisconsin Univ., USA; Brown, Christopher S., Wisconsin Univ., USA; 1997; 8p; In English
Contract(s)/Grant(s): NAS10-12180; NAGw-4022
Report No.(s): NASA/CR-97-206666; NAS 1.26:206666; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Potato explants (leaf, small stem section, and axillary bud), flown on STS-73, developed tubers of 1.5 cm diameter and 1.7 g mass during the 16 day period of spaceflight. The experiment was undertaken in the ASTROCULTURE(Trademark) experiment package under controlled temperature, humidity, lighting, and carbon dioxide concentrations. The tubers formed in the explant system under microgravity had the same gross morphology, the same anatomical configuration of cells and tissues, and the same sizes, shapes, and surface character of starch granules as tubers formed in a 1 g environment. The total accumulation of starch and other energy containing compounds was singular in space flight and ground control tubers. Enzyme activity of starch synthase, starch phosphorylase, and total hydrolase was similar in spaceflight and ground controls but activity of ADP-glucose pyrophosphorylase was reduced in the spaceflight tuber tissue. This experiment documented that potatoes will metabolize and accumulate starch as effectively in spaceflight as on the ground and thus this data provides the potential for effective utilization of potatoes in life support systems of space bases.
Derived from text
Potatoes; Spaceborne Experiments; Space Transportation System; Life Support Systems; Closed Ecological Systems; Microgravity; Enzyme Activity; Carbon Dioxide; Starches

19980006297 Technische Univ., Dept. of Microbiology and Enzymology, Delft, Netherlands
Sulfur Compound Oxidation and Sulfur Production by 'Thiobacillus' sp. W5
Visser, J. M., Technische Univ., Netherlands; May 13, 1997; 116p; In English
Report No.(s): PB97-196471; Copyright Waived; Avail: CASI; A06, Hardcopy; A02, Microfiche

Contents include the following: General introduction; thiobacillus sp. W5, the dominant autotroph oxidizing sulfide to sulfure in a reactor for aerobic treatment of sulfidic wastes; sulfur production by obligately chemolithoautotrophic Thiobacillus species; a novel membrane-bound flavocytochrome c sulfide dehydrogenase sulfur bacterium Thiobacillus sp. W5; purification and characterization of a periplasmic thiosulfate dehydrogenase from the obligately autotrophic Thiobacillus sp. W5; cbb3-type cytochrome oxidase in the obligately chemolithoautotrophic Thiobacillus sp. W5; concluding remarks; and summary.
NTIS
Degradation; Sulfur; Sulfur Compounds; Oxidation; Microorganisms

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AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

19980003879 Advisory Group for Aerospace Research and Development, Aerospace Medical Panel, Neuilly-Sur-Seine, France
Impact Head Injury: Responses, Mechanisms, Tolerance, Treatment and Countermeasures ***Les Traumatismes Craniens Consecutifs aux Impacts: Les Mecanismes, la Tolerance, le Traitement et les Contremesures***
Nov. 1997; 242p; In English; Impact Head Injury: Responses, Mechanisms, Tolerance, Treatment and Countermeasures, 7-9 Nov. 1996, Mescalero, NM, USA; Also announced as 19980003880 through 19980003902
Report No.(s): AGARD-CP-597; ISBN 92-836-1062-8; Copyright Waived; Avail: CASI; A11, Hardcopy; A03, Microfiche

These proceedings include the Technical Evaluation Report, a Keynote Address, and 23 invited papers, of the Specialists' Meeting sponsored jointly by the AGARD Aerospace Medical Panel, the Stapp Car Crash Conference Advisory Committee and the Society of Automotive Engineers. Severe head injury resulting from vehicular accidents is a major concern to military and civilian health care workers. Significant advances have been made in the understanding of the causes of severe brain injury and in the factors, both direct and indirect, that contribute to the pathophysiological changes that follow from a severe head injury. Moreover, advances in design and the proper use of countermeasures can significantly reduce head injuries causing death. This

Specialists' Meeting addressed the issues of severe head injury from the point of view of: (a) the dynamic response of the head during impacts; (b) brain injury mechanisms in diffuse axonal injury; (c) physical and computer models for assessing injury severity; (d) human tolerance and injury criteria; (e) head injury assessment and treatment; (f) epidemiology in head injury mishaps; (g) harmonization and enforcement of standards for protective head gear; (h) personal protective systems in aircraft; and (i) computer simulations for optimizing head impact protective designs. These proceedings will be of interest to military and civilian medical professionals, accident investigators, safety engineers and research scientists concerned with safety issues in vehicular crash protection. They will also benefit the research manager and scientist or flight surgeon requiring a state-of-the-art review of relevant research in the field of impact head protection.
Author
Conferences; Countermeasures; Crashes; Dynamic Response; Head (Anatomy); Human Tolerances; Crash Injuries; Brain Damage; Damage Assessment; Biodynamics; Impact Damage; Impact Resistance; Impact Tests; Physiological Effects

19980003880 Heidelberg Univ., Heidelberg, Germany
Some Observations to the Skull-Brain Trauma
Kallieris, Dimitrios, Heidelberg Univ., Germany; Rizzetti, Andreas, Heidelberg Univ., Germany; Mattern, Rainer, Heidelberg Univ., Germany; Impact Head Injury: Responses, Mechanisms, Tolerance, Treatment and Countermeasures; Nov. 1997; 4p; In English; Also announced as 19980003879; Copyright Waived; Avail: CASI; A01, Hardcopy; A03, Microfiche

Skull-brain injuries are caused through impact against rigid or padded obstacles. Injury pattern and injury severity of skull-brain trauma from experimental head impacts and autopsy cases are reported. The experimental part includes 10 head impacts (frontal, lateral or occipital and rigid or padded) with cadavers at a velocity of 20 km/h. A pneumatic impactor with a movable mass of 23 kg was used, the impact surface was a disc with 150 mm of diameter. Accelerations at the top of the head and the epidural pressure at the contrecoup site were measured. According to the acceleration measurements at the top of the head c.g. amounts between 85 g (padded) and 500 g (rigid); the rotational acceleration of the head around the rotation axis varies between 4700 rad/sec(sup 2) (padded) and 19000 rad/sec(sup 2) (rigid). Furthermore, the epidural pressure is between -20 kPa and -46 kPa. The observed fracture pattern and the injury severity of the skull are well comparable between the experimental exposure and the head impact during a sudden fall on the road. Furthermore, the injury pattern of the brain is also comparable, however, not the injury severity; the haematoma is of higher intensity in the accident cases. The brain injuries of the experiments include contrecoup subarachnoidal haematomas; furthermore skin lacerations were observed. The results are critically discussed with those existing in the literature.
Author
Impact Damage; Impact Tests; Head (Anatomy); Human Tolerances

19980003881 Medical Coll. of Wisconsin, Dept. of Neurosurgery, Milwaukee, WI USA
Impact Biodynamics of Human Skull Fracture
Sances, Anthony, Jr., Medical Coll. of Wisconsin, USA; Yoganandan, Narayan, Medical Coll. of Wisconsin, USA; Pintar, Frank A., Medical Coll. of Wisconsin, USA; Kumaresan, Srirangam, Medical Coll. of Wisconsin, USA; Walsh, Patrick R., Medical Coll. of Wisconsin, USA; Nov. 1997; 6p; In English; Also announced as 19980003879; Sponsored in part by George Snively Memorial Foundation
Contract(s)/Grant(s): DTNH22-93-Y-17028; Copyright Waived; Avail: CASI; A02, Hardcopy; A03, Microfiche

The purpose of the present study was to determine the force-deflection biomechanics of the human cadaveric intact head under quasistatic and dynamic loading. Both nonfracture and fracture studies were conducted under known boundary conditions to delineate the stiffness, energy, and force-deflection characteristics for future use in finite element investigations and helmet protection studies.
Author
Biodynamics; Head (Anatomy); Impact Tests; Human Tolerances; Impact Damage; Damage Assessment; Human Factors Engineering

19980003882 Duke Univ., Dept. of Biomedical Engineering, Durham, NC USA
Basilar Skull Fracture Resulting From Compression Neck Loading
Myers, Barry S., Duke Univ., USA; Richardson, William J., Duke Univ., USA; Nightingale, Roger W., Duke Univ., USA; Nov. 1997; 10p; In English; Also announced as 19980003879; Sponsored in part by Virginia Flowers Baker Chair
Contract(s)/Grant(s): R49/CCR402396-10; Copyright Waived; Avail: CASI; A02, Hardcopy; A03, Microfiche

A cadaver head and neck impact model has been developed to produce a wide variety of clinically observed cervical spine injuries and basilar skull fractures. The impact model includes a drop track which allows impact of the head and neck with a simu-

lated torso mass following into an obliquely oriented surface with varying amounts of surface padding. Twenty unembalmed ligamentous cadaver head-neck specimens have been dropped in an inverted posture with the head and neck in the anatomically neutral position. Multiaxis transduction recorded head impact forces, planar head accelerations, and neck reactions. In addition, the impact tests were imaged using a high speed imaging system at 1000 frames. The head-neck-torso response was bimodal, including a head inertial loading mode followed by a neck-impact surface loading mode. A total of three basilar skull fractures were produced among 16 specimens suffering injuries, one in an impact to a rigid surface, and two in impacts to padded surfaces. Additionally, each of these injuries occurred in the neck-impact loading mode and were therefore unrelated to peak head impact force, or head acceleration. These data suggest that these injuries may occur with greater frequency than previously thought. They also suggest that some basilar skull fractures occur mechanistically like neck injuries and are not likely to be mitigated with the addition of impact surface padding.
Author
Impact Tests; Skull; Impact Damage; Human Tolerances; Damage Assessment; Human Factors Engineering; Spine

19980003883 Pennsylvania Univ., Dept. of Bioengineering, Philadelphia, PA USA
The Role of Kinetic Loading Parameters on the Severity of Diffuse Axonal Injury in Closed Head Injury
Miller, R. T., Pennsylvania Univ., USA; Smith, D. H., Pennsylvania Univ., USA; Han, X., Pennsylvania Univ., USA; Xu, B., Pennsylvania Univ., USA; McIntosh, T. K., Pennsylvania Univ., USA; Meaney, D. F., Pennsylvania Univ., USA; Nov. 1997; 8p; In English; Also announced as 19980003879; Sponsored in part by Ashton Fellowship
Contract(s)/Grant(s): R49/312712; NIH-NS-08803; Copyright Waived; Avail: CASI; A02, Hardcopy; A03, Microfiche

In this report, we describe relationships between the kinetic loading parameters and the incidence of axonal injury in an experimental model of diffuse axonal injury used in our laboratory. Twenty animals (Hanford miniature pig, 13-20 kg, 3-4 months old) were injured using a coronal plane rotational acceleration of the head. Both the magnitude of angular acceleration and change in angular velocity were varied in these tests over a controlled range (56-260 krad/s(sup 2); 174-472 rad/s). Seven days following injury, injured brains were examined using immunocytochemical markers for injury (NF200, SMI-3, and SMI-32) and maps of both the axonal injury distribution and severity were produced for selected coronal planes. Analysis of these injury maps revealed that the extent of injury in the mid-hippocampal plane was reasonably correlated to kinetic loading parameters (R=.66,.76), but that the correlations were less strong when focusing on specific intensities of axonal injury. Additionally, the severity of axonal injury in a given location, correlated to the loading parameters, but the changes were not statistically significant. Together, this study forms an important starting point for relating load parameters to injury within the brain, and can likely be improved with more advanced computational modeling capabilities.
Author
Axons; Brain Damage; Damage Assessment; Head (Anatomy); Impact Tests; Impact Damage

19980003884 Pennsylvania Univ., Dept. of Bioengineering, Philadelphia, PA USA
In Vivo Mechanical Thresholds for Traumatic Axonal Damage
Bain, Allison C., Pennsylvania Univ., USA; Billiar, Kris L., Miami Univ., USA; Shreiber, David I., Pennsylvania Univ., USA; McIntosh, Tracy K., Pennsylvania Univ., USA; Meaney, David F., Pennsylvania Univ., USA; Nov. 1997; 12p; In English; Also announced as 19980003879
Contract(s)/Grant(s): NIH-NS-08803; Copyright Waived; Avail: CASI; A03, Hardcopy; A03, Microfiche

A methodology to identify tissue level axonal stress and strain from macroscopic parameters is outlined. A non-linear, viscoelastic, structural relationship is proposed to describe the in vivo response of the guinea pig optic nerve to uniaxial elongation. The optic nerve is modeled as a bundle of parallely aligned axons undulated to varying degrees. When straightened, each axon displays non-linear, viscoelastic behavior that contributes to the overall behavior of the optic nerve. Optic nerves were examined microscopically to calculate the undulation of individual axons. Axonal undulation was found to follow a gamma distribution, with a mean undulation of 1.070 and a standard deviation of 0.053. A reduced relaxation function, consisting of two exponential terms, was approximated from in vivo, dynamic elongation of the guinea pig optic nerve. Results from the in vivo relaxation tests indicated that the relaxation behavior was independent of displacement, a requirement for linear, viscoelastic theory based on hereditary integrals. The instantaneous elastic function was expressed as an integral of the undulation distribution and a function of the stretch ratio. Initially, a linear stretch ratio function was assumed to analyze the effects of the undulation distribution on the instantaneous elastic response. These results were compared with those obtained by increasing the order of the stretch ratio function to a third order polynomial. The computed results of the proposed structural relationship compared well to the experimental data

from in vivo optic nerve tests, indicating that this model could provide a framework for identifying axonal thresholds for traumatic injury.
Author
Axons; Nerves; Damage Assessment; Models; Brain Damage

19980003885 Chrysler Corp., Auburn Hills, MI USA
Modeling Cavitation during Head Impact
Nusholtz, Guy, Chrysler Corp., USA; Glascoe, Lee G., Michigan Univ., USA; Wylie, E. Benjamin, Michigan Univ., USA; Nov. 1997; 12p; In English; Also announced as 19980003879; Copyright Waived; Avail: CASI; A03, Hardcopy; A03, Microfiche

The effects of stress in brain material was investigated with experimental and computational idealizations of the head. A water-filled cylinder impacted by a free traveling mass serves to give insight into what could happen to the brain during impact; particularly the effect of the state of stress on possible physical changes in the brain material. When the cylinder is struck by a free-flying mass of sufficient velocity, cavitation is initiated at the boundary opposite impact. Significant vaporous regions may develop at the boundary, while only limited vaporization occurs internally. The vaporization that does occur internally consists of diffuse micro-voids. Higher accelerations, or an additional loading of the domain by a constant acceleration perpendicular to impact, adds to the likelihood and to the increased severity of internal cavitation, increasing the size, number and density of micro-voids. As a result, the micro-voids that form may not only produce injuries in the typically perceived cavitation damage response, i.e., violent cavity collapse, but also by producing local large strains as a result of cavity formation. In addition, when a local section of brain is significantly populated with micro-voids, the bulk and shear properties can change. Therefore, cavitation-caused cellular damage, including a non-violent collapse mechanism resulting from stress in the brain material might be more common than previously thought. Cavitation occurred in these experiments at accelerations greater than 150 g's.
Author
Impact Damage; Damage Assessment; Head (Anatomy); Brain Damage; Mathematical Models; Cavities

19980003886 Wayne State Univ., Bioengineering Center, Detroit, MI USA
Head Injury Assessment of a Real World Crash by Finite Element Modeling
Zhou, Chun, Wayne State Univ., USA; Khalil, Twafik B., Wayne State Univ., USA; King, Albert I., Wayne State Univ., USA; Dragovic, Ljubisa J., County of Oakland, USA; Nov. 1997; 8p; In English; Also announced as 19980003879
Contract(s)/Grant(s): R94/CCR503534-07; Copyright Waived; Avail: CASI; A02, Hardcopy; A03, Microfiche

This paper demonstrates the potential of the WSU (Wayne State University) Brain Injury Model in predicting brain injuries sustained in a real motor vehicle crash. The particular case simulated here was a side impact in which the victim succumbed to multiple injuries, including a severe brain injury. The first step in the process was to use the EDSMAC code to obtain gross vehicular kinematics. The output of the EDSMAC run was used as input to a MADYMO simulation of the occupant kinematics and interaction with the vehicular structures of both the struck and striking vehicles. The computed head acceleration was then applied to the new three-dimensional finite element model of the head to determine the response of the brain to this crash loading. The injury severity was assessed by identifying areas of high shear strain and comparing them with autopsy data that showed locations of petechial hemorrhage where diffuse axonal injury (DAI) presumably occurred. The crash reconstruction revealed a possible head contact with the hood of the striking vehicle, even though no signs of contact were seen on the head at autopsy. The estimated resultant linear acceleration was about 220 g's. The estimated lateral angular acceleration was about 20,000 rad/s(sup 2). The estimated sagittal angular acceleration was about 11,000 rad/s(sup 2). Better estimation could have been made if more information were available. The shear strain distribution within the brain exhibited some degree of correspondence with the sites of DAI. It is very promising that the shear stress contours can be used to make predictions of DAI.
Author
Three Dimensional Models; Brain Damage; Human Tolerances; Impact Damage; Damage Assessment; Crash Injuries; Head (Anatomy)

19980003887 General Motors Corp., Safety Research Dept., Warren, MI USA
Tissue Level Injury Criteria using Brain Finite Element Analysis, Bilateral Impact Model
Ueno, Kazunari, General Motors Corp., USA; Melvin, John W., General Motors Corp., USA; Nov. 1997; 16p; In English; Also announced as 19980003879; Copyright Waived; Avail: CASI; A03, Hardcopy; A03, Microfiche

A finite element model of a cortical impact experiment following double craniotomy was built and exercised independently with three different finite element programs, i.e., Dyna3d, Pamcrash and Abaqus as a partial validation of the protocol in establishing tissue level injury criteria for the head/brain subjected to an impact load. A typical experimental impactor motion (4 mm displacement in 1.5 ms, 5 m/s initial velocity) was successfully simulated in all programs and the results were favorably compared

to each other in terms of overall stress values, time histories and distributions. The peak Von-Mises stress (120 kPa) was observed in the depth of the brain while the pressure peak (160 kPa) was observed at the surface of the brain. Both pressure and Von-Mises stress wave propagations were in accord with the theoretical wave speeds. The explicit programs (Dyna3d and Pamcrash) have a 600 fold CPU advantage and a smoother stress response compared to the implicit program (Abaqus).
Author
Finite Element Method; Mathematical Models; Crash Injuries; Brain Damage; Head (Anatomy); Applications Programs (Computers)

19980003888 National Highway Traffic Safety Administration, Washington, DC USA
Use of Finite Element Analysis and Dummy Test Measurements in the Assessment of Crash Impact Traumatic Brain Injury
Bandak, F. A., National Highway Traffic Safety Administration, USA; Tannous, R. E., George Washington Univ., USA; Eppinger, R. H., National Highway Traffic Safety Administration, USA; Toridis, T., George Washington Univ., USA; DiMasi, F., Federal Aviation Administration, USA; Zhang, A. X., Conrad Technologies, Inc., USA; Nov. 1997; 14p; In English; Also announced as 19980003879; Copyright Waived; Avail: CASI; A03, Hardcopy; A03, Microfiche

Three computational models were used to interpret experimental data as a first step in developing a process to predict traumatic brain injury (TBI) potential in motor vehicle crashes. The process and the prevailing conditions limiting its current viability are discussed. The first model, a two dimensional model of the miniature pig brain, was gauged against existing experimental data using a previously introduced Cumulative Strain Damage Measure (CSDM). Results from this model were utilized in the analysis of output from two simple three dimensional models of the human brain one representing an adult and the other scaled in a crude attempt to simulate the six year old child brain. The miniature pig computer model was subjected to loads identical to those used in existing brain injury experiments. The human models were loaded using measured kinematic response data from actual crash dummy tests. The dummy test data was converted to model loadings using a previously reported method and a new experimental technique for measuring the spatio-temporal distribution of pressure resulting from head impact is also introduced. Twelve cases were analyzed using the two human finite element models. Six involved the Hybrid III dummy and six involved the six year child version of the dummy. The crash test results were evaluated on the basis of several proposed finite element based brain damage measures as well as the values of the Head Injury Criterion. Preliminary results indicate that the proposed procedure is feasible for the assessment of head injury potential pending the availability of material data and consistent load measurement processes.
Author
Brain Damage; Crash Injuries; Finite Element Method; Three Dimensional Models; Head (Anatomy); Impact Tests; Impact Damage; Damage Assessment

19980003889 General Motors Corp., Safety Center, Warren, MI USA
Head Injury Risk Assessments Based on 15 MS HIC and Peak Head Acceleration Criteria
Mertz, H. J., General Motors Corp., USA; Prasad, P., Ford Motor Co., USA; Nusholtz, G., Chrysler Corp., USA; Nov. 1997; 10p; In English; Also announced as 19980003879; Copyright Waived; Avail: CASI; A02, Hardcopy; A03, Microfiche

A review is given of the development of the Head Injury Risk Curve (HIRC) which is based on 15 ms HIC, and the Skull Fracture Risk Curves (SFRC) which are based on the 15 ms HIC and the Peak Head Acceleration criteria respectively. Each of the risk curves was developed by analyzing the relevant cadaver head impact data using the Mertz/Weber Method which is a simplified form of the Median Rank technique. The Mertz/Weber Method was used to estimate the injury risk to the adult driving population because the test samples of cadavers were biased with specimens having poorer bone conditioning factors than the driving population. The Mertz/Weber Method is not affected by this type of bias since the form of the distribution curve is assumed apriori. The efficacy of the Head Injury Risk curve is demonstrated by noting that the predicted reduction in head injuries due to certification of American football helmets based on the HIRC was 78 percent compared to the actual reduction in head injury risk of 74 percent. The efficacy of the Skull Fracture Risk Curve based on 15 ms HIC is demonstrated using a finite element model of the head. There was no agreement between model results and the SFRC based on peak head acceleration since the time-dependency associated with bone failure is not addressed by the Peak Head Acceleration criterion. This limitation of the Peak Head Acceleration criterion is demonstrated by analyzing Transport Canada's 30 mph rigid barrier vehicle test results. Assuming a 5 percent risk of skull fracture as a design limit, then 20 tests would fail to meet this limit based on the 15 ms HIC criterion, but only 10 tests would fail based on the Peak Head Acceleration criterion. Further, it is noted that the proposed 80 G limit for Peak Head Acceleration is very design restrictive since it represents a 0.1 percent risk of skull fracture. The corresponing 15 ms HIC value for this level of skull fracture risk is 100.
Author
Head (Anatomy); Injuries; Risk

19980003890 Cambridge Univ., Cambridge, UK

Complementary Role of Functional Brain Imaging and Multi-Modality Bedside Monitoring for Acute Brain Injury: Pathophysiology and Surrogate End Points

Pickard, John D., Cambridge Univ., UK; Kirkpatrick, Peter J., Cambridge Univ., UK; Czosnyka, Marek, Cambridge Univ., UK; Menon, David, Cambridge Univ., UK; Minhas, Parvan, Cambridge Univ., UK; Smielewski, Peter, Cambridge Univ., UK; Clark, John, Cambridge Univ., UK; Herrod, Nick, Cambridge Univ., UK; Carpenter, Adrian, Cambridge Univ., UK; Downey, Stephen, Cambridge Univ., UK; Kendall, Iona, Cambridge Univ., UK; Nov. 1997; 4p; In English; Also announced as 19980003879; Copyright Waived; Avail: CASI; A01, Hardcopy; A03, Microfiche

This paper reviews the advances in management of non missile head injury over the past 30 years, and the factors known to affect outcome. It has proven difficult to exploit recent advances in the development of novel neuroprotective agents in patients with head injury and the reasons are explored together with the emerging role of multi-modality bedside monitoring and functional brain imaging (Positron Emission Tomography and Magnetic Resonance) in defining more homogeneous sub-groups of patients for more focussed trials of such novel agents.

Author

Brain Damage; Imaging Techniques; Injuries; Damage Assessment; Head (Anatomy)

19980003891 Armstrong Lab., Neuropsychiatry Branch, Brooks AFB, TX USA

Closed Head Injury and the Military Aviator: Assessing Cognitive Dysfunction and Seizure Risk

Drew, William E., Armstrong Lab., USA; Patterson, John C., Armstrong Lab., USA; Nov. 1997; 4p; In English; Also announced as 19980003879; Copyright Waived; Avail: CASI; A01, Hardcopy; A03, Microfiche

Over the last several years, two concerns have become evident with respect to the aeromedical disposition of aviators following closed head injuries. The first problem is that aviators, even with mild closed head injuries, often have subtle cognitive impairment. This impairment is often not apparent on clinical examination or cursory mental health evaluation such as the Folstein Mini-Mental State Examination. The second problem is the risk of post-traumatlc seizures primarily in aviators with moderate or severe closed head injuries. Both of these conditions clearly are problematic for the flying population in terms of information processing and sudden incapacitation. As task saturation poses a problem for individuals with the highest levels of cognitive functioning and psychomotor skills, i.e., "Top Guns", any cognitive impairment, to include cognitive slowing, poses a risk for flying safety. Clearly, sudden incapacitation, such as those resulting from post-traumatic seizure are incompatible with flying safety as well. An important aspect of closed head injury in occupational and aerospace medicine is the classification. Based on this classification, a research program has been developed to further study head injury as it relates to aeromedical disposition.

Author

Aircraft Pilots; Head (Anatomy); Physiological Effects; Risk; Cognition; Crash Injuries; Damage Assessment; Seizures

19980003892 Wayne State Univ., School of Medicine, Detroit, MI USA

Secondary Injury After Severe Traumatic Brain Injury: Mechanisms Toward Which Clinical Trials Are Targeted

Muizelaar, J. Paul, Wayne State Univ., USA; Nov. 1997; 4p; In English; Also announced as 19980003879; Copyright Waived; Avail: CASI; A01, Hardcopy; A03, Microfiche

In this paper, we cite literature showing that after traumatic brain injury (TBI) much of the damage is done well after the impact, even though the morphological appearance might suggest otherwise. The biochemical cascades leading to this secondary or delayed injury are demonstrated. Drugs are available to interfere with specific pathways or steps in these biochemical cascades. The general principals of clinical trials to test the safety and efficacy of these drugs are described: Double-blind, randomized, placebo-controlled design; Entry criteria, concerning the severity of the injury, mostly based on the Glasgow Coma Scale; Outcome measurement, mostly based on the Glasgow Outcome Scale. Specific drugs and the status of their clinical trials are also described: Oxygen radical scavengers and lipid peroxidase inhibitors have failed in large scale, phase III trials; NMDA receptor antagonists are currently in phase III trials. Different types of calcium channel blockers have been tested or are ready to enter into phase III trials. Some trials with drugs with different mechanisms or trials with new management strategies (hypothermia) are also mentioned.

Author

Biochemistry; Brain Damage; Injuries; Drugs

19980003893 Institute of Neurological Sciences, Glasgow, UK

Head Protection: Motor Cyclists, Sports and Industry

Doyle, D., Institute of Neurological Sciences, UK; Sturrock, K., Institute of Neurological Sciences, UK; Nov. 1997; 8p; In English; Also announced as 19980003879; Copyright Waived; Avail: CASI; A02, Hardcopy; A03, Microfiche

Protection against brain injury has been the major concern of those who have been involved in the design of head wear for participants in dangerous pursuits. Various forms of head gear have been available throughout the ages for horsemen and those concerned with military pursuits. The development of engine driven vehicles and aircraft has led to empirically designed protective hats and helmets but, relatively recently, the scientific input into the design of helmets has become more noticeable. These have led to the creation of national and international standards for the design of helmets for various activities. One of the purposes of the studies, in which we have been involved, has been the evaluation of causes of brain injuries. Looking at these, with a view to brain protection, has led to a number of observations which seem relevant to the development of protective helmets. We have had the opportunity to study accidents and injuries in pedal cyclists, motor cyclists, horse riders, vehicle occupants, pilots and industrial workers, all of which groups have had helmets specifically designed for their use. An attempt is being made to provide information on mechanisms of brain injury in humans and to provide information on the value and performance of helmets.
Author
Brain Damage; Helmets; Protection; Crash Injuries; Head (Anatomy)

19980003896 Army Aeromedical Research Lab., Fort Rucker, AL USA
US Army Aircrew Helmets: Head Injury Mitigation Technology
McEntire, B. Joseph, Army Aeromedical Research Lab., USA; Nov. 1997; 10p; In English; Also announced as 19980003879; Copyright Waived; Avail: CASI; A02, Hardcopy; A03, Microfiche

Head injury remains the predominant cause of severe and fatal injuries to Army aircrew involved in helicopter mishaps. As a means to prevent injuries or reduce their severity, the U.S. Army has continuously sought improvements to aviator helmets. Numerous improvements have resulted from analysis of helmets involved in aviation accidents and the wearer's injuries. It is believed that the newest Army aviator helmet, the HGU-56/P, offers significant improvements over earlier designs. This paper presents a chronology of Army aviator helmets with descriptions defining their differences and improvements.
Author
Helmets; Impact Resistance; Crash Injuries; Product Development; Head (Anatomy)

19980003986 NERAC, Inc., Tolland, CT USA
Carpal Tunnel Syndrome and Other Repetitive Motion Disorders (Latest citations from the NTIS Bibliographic Database)
Nov. 1996; In English; Page count unavailable
Report No.(s): PB97-851224; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the prevention of carpal tunnel syndrome and other repetitive motion injuries. Citations focus on risk factors and biomechanics associated with the disorders. Ergonomics, work habits, and case studies are covered. The citations also examine Health Hazard Evaluation Reports and videos describing preventive strategies.
NTIS
Human Factors Engineering; Biodynamics; Bibliographies; Health; Signs and Symptoms; Injuries

19980004034 Madigan Army Medical Center, Takoma, WA USA
The Female Athlete Triad: Prevalence in Military Women ***Final Report, 22 Dec. 1995 - 30 Jun. 1997***
Lauder, Tamara D., Madigan Army Medical Center, USA; Jul. 1997; 38p; In English
Contract(s)/Grant(s): MIPR-96MM6637
Report No.(s): AD-A330021; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The female athlete triad, otherwise known as the inter-relatedness of disordered eating, amenorrhea, and osteoporosis, is an area of increasing awareness in female athletes, which has not been explored in military women. We conducted a 3 part prospective cross-sectional study to define the prevalence of eating disord ers, menstrual irregularities, and the full female athlete triad in military women. A total of 423 female soldiers from the general active-duty population completed Part 1 which included the Eating Disorder Inventory (EDI). Any woman meeting the screening criteria for being 'at risk' (AR) for abnormal eating behaviors underwent a clinical interview to determine whether or not they had a true eating disorder (ED). of the 423 women who participated, 33.6% (n=142) met the screening criteria for being AR for an eating disorder with 33 women (8%) actually meeting the criteria for an ED. Part 2 of the study, consisted of a clinical evaluation and laboratory studies of any woman with menstrual irregularities (MI). Including all women, 9% had amenorrhea, 6% oligomenorrhea, and 12% had onset of menarche older than 14 years of age. Excluding all women on hormonal birth control, the prevalence dropped to 2.1%, 3.3%, and 9.2% for amenorrhea, oligomenorrhea, and menarche older than age 14 respectively. of the women not on hormonal birth control, only 1% had both an ED and MI, and 3.5% of women AR also had MI. Part 3 of the study evaluated the bone mineral density (BMD) of all women from Parts 1

and 2 using dual energy x-ray absorptiometry (DEXA). There was no significant difference between the BMD of the femoral neck or the lumbar spine of 32 eumenorrheic controls with no abnormal eating behaviors and subjects with either MI, ED, or AR alone. Looking at those women with 2 variables, no women with both an ED and MI had the full triad who were not on hormonal birth
DTIC
Athletes; Females; Osteoporosis; Lumbar Region; Bones; Order-Disorder Transformations

19980004121 Army Research Inst. of Environmental Medicine, Natick, MA USA
Human Adaptation to Hot Environments
Wenger, C. B., Army Research Inst. of Environmental Medicine, USA; Aug. 20, 1997; 80p; In English
Report No.(s): AD-A330520; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

Extreme temperatures injure tissue directly. A protein's biological activity depends on the location of electrical charges in the molecule and on its overall configuration. Many physicochemical processes can alter a protein's configuration and charge distribution, and thus change its activity, without affecting the sequence of amino acids. Such alteration of a protein is called denaturation; and by inactivating a cell's proteins, denaturation injures or kills the cell. High temperature can denature proteins, and a familiar illustration of this effect is the coagulation of the albumin in the white of a cooked egg. If living tissue is heated, injury occurs at temperatures higher than about 45 deg C, which is also the temperature at which heating the skin causes pain. The degree of injury depends on both temperature and duration of the heating. As a water-based solution freezes, crystals of pure ice form. Thus all the dissolved substances are left behind in the liquid which has not yet frozen, and which becomes more and more concentrated as more ice forms. Freezing damages cells through two mechanisms. First, ice crystals themselves probably disrupt the cell membranes mechanically. Second, the increase in solute concentration of the cytoplasm as ice forms denatures the proteins by removing their water of hydration, by increasing the ionic strength of the cytoplasm, and by other changes in the physicochemical environment in the cytoplasm.
DTIC
High Temperature Environments; Human Tolerances; Adaptation; Heat Tolerance

19980004605 Pennsylvania Univ., Dept. of Neurology, Philadelphia, PA USA
Sensitivity Evaluation of Clinical Brain Metabolism ***Final Report, 1 Feb. 1992 - 31 May 1996***
Jaggi, J. L., Pennsylvania Univ., USA; Apr. 12, 1997; 8p; In English
Report No.(s): PB97-161137; R49-CCR-306290; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

This project will study in acute comatose head-injury patients the true cerebral metabolic rate oxygen for development of a meaningful corrective factor which could be used for non-invasive calculation of clinical brain metabolism. Achievement of the goals could be of substantial importance in improving head injury care in providing more accurate but simple prognostic tools.
NTIS
Sensitivity; Brain; Metabolism; Injuries

19980004618 National Defence Research Establishment, Avedelningen foer NBC Skydd, Umea, Sweden
Pesticide Fire: A Human Health Hazard? Pesticides and Fire Products in Smoke
Lilliehoeoek, B., National Defence Research Establishment, Sweden; Dec. 1996; 34p; In English
Report No.(s): PB97-164800; FOA-R-96-00275-4.9-SE; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

In this report, the amount of burning pesticides that may remain unchanged in smoke from a fire is discussed. Furthermore, the toxicity of pesticides and smoke gases are described and how the toxicity is increased with simultaneous exposure of these chemicals. In a fire, there are different phases where the oxygen supply and the temperature are important parameters for the composition of the smoke. One conclusion is that the health hazard in this type of smoke is difficult to predict, since the fire scenario may be more important for the toxicity than the type of burning pesticides.
NTIS
Pesticides; Smoke; Combustion Products; Fires

19980004788 NERAC, Inc., Tolland, CT USA
Toxicity of Phtalates: Latest citations from the Life Sciences Collection Database
May 1997; In English; Page count unavailable, Supersedes PB96-861497.
Report No.(s): PB97-860050; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the biological effects of phtalate exposure. Measurement of phtalate levels in fish, pork, and hens is discussed. The effects of phtalates on reproductive organs, skin, lungs, liver, and blood are examined.

Toxicity, carcinogenesis, and mutagenicity caused by phtalates are described. The effect of phtalates on earthworms, coral, lichen, bacteria, and mussels is briefly discussed.
NTIS
Bibliographies; Toxicity; Carcinogens; Environmental Surveys; Life Sciences; Bacteria

19980004791 Texas Univ. Health Science Center, Houston, TX USA
Gene Regions Responding to Skeletal Muscle Atrophy ***Final Report***
Booth, Frank W., Texas Univ. Health Science Center, USA; [1997]; 6p; In English
Contract(s)/Grant(s): NCC9-36
Report No.(s): NASA/CR-97-113070; NAS 1.26:113070; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Our stated specific aims for this project were: 1) Identify the region(s) of the mouse IIb myosin heavy chain (MHC) promoter necessary for in vivo expression in mouse fast-twitch muscle, and 2) Identify the region(s) of the mouse IIb MHC promoter responsive to immobilization in mouse slow-twitch muscle in vivo. We sought to address these specific aims by introducing various MHC IIb promoter/reporter gene constructs directly into the tibialis anterior and gastrocnemius muscles of living mice. Although the method of somatic gene transfer into skeletal muscle by direct injection has been successfully used in our laboratory to study the regulation of the skeletal alpha actin gene in chicken skeletal muscle, we had many difficulties utilizing this procedure in the mouse. Because of the small size of the mouse soleus and the difficulty in obtaining consistent results, we elected not to study this muscle as first proposed. Rather, our MHC IIb promoter deletion experiments were performed in the gastrocnemius. Further, we decided to use hindlimb unloading via tail suspension to induce an upregulation of the MHC IIb gene, rather than immobilization of the hindlimbs via plaster casts. This change was made because tail suspension more closely mimics spaceflight, and this procedure in our lab results in a smaller loss of overall body mass than the mouse hindlimb immobilization procedure. This suggests that the stress level during tail suspension is less than during immobilization. This research has provided an important beginning point towards understanding the molecular regulation of the MHC lIb gene in response to unweighting of skeletal muscle Future work will focus on the regulation of MHC IIb mRNA stability in response to altered loading of skeletal muscle
Derived from text
Mice; Muscles; Musculoskeletal System; Immobilization

19980005365 Army Research Lab., Soldier Performance Div., Aberdeen Proving Ground, MD USA
Load Carriage in Military Operations: A Review of Historical, Physiological, Biomechanical, and Medical Aspects
Knapik, Joseph, Army Research Lab., USA; Reynolds, Katy, Army Research Inst. of Environmental Medicine, USA; Jan. 1997; 44p; In English
Report No.(s): AD-A330082; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Because of mission requirements or the limited transportation assets of some types of units (e.g., U.S. Army light infantry), service members must often depend on their personal mobility to move individual equipment. The carrying of loads by troops is an important aspect of military operations that can become critical in some situations. Overloading with ammunition and equipment can lead to excessive fatigue and impair the ability to fight. Military historians cite numerous examples where heavy loads directly or indirectly resulted in reduced performance, unnecessary deaths, and lost battles. The purpose of this paper is to review the historical, physiological, biomechanical, and medical aspects of load carriage. Practical suggestions are offered for reducing the stress of loads on service members and for preventing and treating common load-carriage related injuries.
DTIC
Military Operations; Load Distribution (Forces); Ammunition; Human Performance

19980005855 Environmental Protection Agency, Office of Research and Development, Washington, DC USA
Guidelines for Reproductive Toxicity Risk Assessment ***Final Report***
1996; 167p; In English
Report No.(s): PB97-100093; EPA/630/R-96/009A; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

This notice describes the scientific basis for concern about exposure to agents that cause reproductive toxicity, outlines the general process for assessing potential risk to humans from exposure to environmental agents, and addresses Science Advisory Board and public comments on the 1994 Proposed Guidelines for Reproductive Toxicity Risk Assessment (PB94-155827).
NTIS
Reproduction (Biology); Toxicity; Exposure; Risk; Environment Pollution

19980006323 Army Research Inst. of Environmental Medicine, Military Performance Div., Natick, MA USA

Effects of a Specifically Designed Physical Conditioning Program on the Load Carriage and Lifting Performance of Female Soldiers

Harman, Everett, Army Research Inst. of Environmental Medicine, USA; Frykman, Peter, Army Research Inst. of Environmental Medicine, USA; Palmer, Christopher, Army Research Inst. of Environmental Medicine, USA; Lammi, Eric, Army Research Inst. of Environmental Medicine, USA; Reynolds, Katy, Army Research Inst. of Environmental Medicine, USA; Jan. 1997; 108p; In English

Report No.(s): AD-A330237; USARIEM-T98-1; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

Forty-six women were studied to determine whether their ability to perform 'very heavy' Army jobs could be improved by a specially designed 24-week physical training program administered within normal Army time constraints; 32 subjects remained for the entire testing and training program. The training program proved effective. The weight of boxes the women could lift to three different heights improved between 30% and 47%. After training, the average box-weight the women could lift onto a truck was 118 pounds, 81% of the Army male value. The number of 40-pound boxes the women could lift onto a truck in 10 minutes increased from 106 to 140. The number of 40-pound boxes that could be lifted off the ground, carried 25 feet and placed onto a truck increased from 53 to 62. Vertical jump and standing long jump distance increased 20% and 15% respectively. The speed at which a 75 pound backpack could be carried over a 2-mile mixed-terrain course increased from 3.4 to 4.4 miles per hour. Before the training, only 24% of the women could qualify for 'very heavy' Army jobs; after the training, 78% could qualify. Body composition improved as well.

DTIC

Physical Fitness; Education; Armed Forces

53
BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

19980004509 Technische Univ., Faculty of Technical Mathematics and Informatics, Delft, Netherlands

Preferences in Perspective

Lootsma, F. A., Technische Univ., Netherlands; 1996; ISSN 0922-5641; 20p; In English

Report No.(s): PB97-208276; Rept-96-145; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

In order to model the preferences of the decision makers in Multi-Criteria Decision Analysis (MCDA), we assume that decision are always made within a particular context. Under each criterion, we represent the context by an interval, the range of acceptable performance data on the corresponding dimension. Next, starting from a particular viewpoint we partition the range into a small number of subintervals which are subjectively equal. Several examples in planning and classification show that the gridpoints demarcating the subintervals constitute a geometric sequence with a progression factor which is roughly equal to 2. We briefly describe how these ideas have been implemented in the REMBRANDT program for MCDA.

NTIS

Decision Theory; Criteria; Classifications

54
MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing. For related information see also 16 Space Transportation.

19980003894 Army Aeromedical Research Lab., Aircrew Protection Div., Fort Rucker, AL USA

Head Injury Risk in US Army Rotary-Wing Mishaps: Changes Since 1980

Shannon, Samuel G., Army Aeromedical Research Lab., USA; Albano, John P., Army Aeromedical Research Lab., USA; Licina, Joseph R., Army Aeromedical Research Lab., USA; Nov. 1997; 10p; In English; Also announced as 19980003879; Copyright Waived; Avail: CASI; A02, Hardcopy; A03, Microfiche

Over the past several decades, data have been collected on U.S. Army aircraft mishaps defining the environment within an aircraft during a mishap, injuries suffered by the occupants, and the cause (or causes) of the mishap, if known. An analysis of these data indicates 60% of the occupants are injured, one-third fatally, if the mishap concludes with the aircraft impacting the ground. More significantly, despite improvements in helicopter design, restraint systems, and personal protective equipment, 68% of all

fatalities had at least one fatal injury to the head. After adjusting for differences in mishaps, including the aircraft series, and the occupant's station within the aircraft, the authors concluded that an occupant's injury risk in a helicopter mishap had decreased significantly between 1980-84 and 1990-94. One factor in this was a decline in the risk of head injury, which declined by 50%. Injury risks to the face and brain, critical anatomical regions of the head, also showed a significant decline. Risks of injury to the neck, torso, and upper extremities were not significantly different between the two time intervals. Although the authors could not identify causative factors with clear implications for preventive strategies, the proportion of new, crashworthy helicopters in the U.S. Army fleet have risen steadily since 1980 and a new flyer's helmet with improved impact protection, the SPH-4B, was fielded by the U.S. Army in the 1990's.
Author
Aircraft Accidents; Risk; Crashes; Helicopters; Crash Injuries

19980003895 Royal Air Force, School of Aviation Medicine, Farnborough, UK
Standards for Protective Helmets
Glaister, D. H., Royal Air Force, UK; Nov. 1997; 4p; In English; Also announced as 19980003879; Copyright Waived; Avail: CASI; A01, Hardcopy; A03, Microfiche

Undoubtedly, the protection afforded by helmets for sporting activities, the workplace and the military has improved over the years, but at a somewhat modest pace. Many published reports attest to the benefits of helmet wear in most applications, but equally show that brain damage and death can still occur despite the wearing of approved headgear, and not always under conditions of massive 'unsurvivable' impact. A better understanding of the mechanics of brain injury, the continued application of accident data, the development of more appropriate helmet test methods and the availability of new materials, together with a growing public awareness of safety, should allow the makers of standards to demand further improvements from helmet manufacturers and ensure a continuing fall in morbidity and death from head injury.
Derived from text
Helmets; Protection; Head (Anatomy); Crash Injuries; Standardization; Product Development

19980003897 Army Aeromedical Research Lab., Fort Rucker, AL USA
Mass Requirements for Helicopter Aircrew Helmets
McEntire, B. Joseph, Army Aeromedical Research Lab., USA; Shanahan, Dennis F., Army Aeromedical Research Lab., USA; Nov. 1997; 6p; In English; Also announced as 19980003879; Sponsored in part by Program Managers for Comanche; Copyright Waived; Avail: CASI; A02, Hardcopy; A03, Microfiche

Helicopter aircrew helmets are becoming more sophisticated with increased mission requirements. This increase results in additional mass being supported on the aircrew's head. Ultimately, there is a limit to how much mass can be supported by the aircrew without increasing the fatigue rates and neck injury risk in accidents. This paper reviews the past mass property requirements of Army helicopter helmets. Current requirements for the RAH-66 Comanche helmet are also detailed with the rationale for their derivation.
Author
Helmets; Center of Mass; Mass Distribution; Structural Design Criteria; User Requirements

19980003898 Simula, Inc., Phoenix, AZ USA
Inflatable Restraint Systems for Reducing Head Injury
Zimmermann, Richard E., Simula, Inc., USA; Yaniv, Gershon, Simula, Inc., USA; Nov. 1997; 14p; In English; Also announced as 19980003879; Copyright Waived; Avail: CASI; A03, Hardcopy; A03, Microfiche

Inflatable restraint systems, in the form of "air bags," are widely recognized as an effective means of reducing crash injury in automobiles. In order to provide similar crash injury protection in both commercial and military aircraft, a variety of inflatable restraint systems are now being developed. For commercial aircraft, the Passenger Air Bag System, (PABS) will provide protection for occupants in seats positioned behind bulkheads, galleys, or restrooms. The first application of PABS will be on the Jetstream J-41 aircraft. For military aircraft, a number of inflatable restraint systems are also being developed for the special conditions found in their crewstations. In addition to the Cockpit Air Bag System (CABS) that has similarities to automotive air bags, there is the Inflatable Body and Head Restraint System (IBAHRS) for use in some attack helicopters, and the Inflatable Tubular Structure (ITS) for use in small helicopters.
Author
Air Bag Restraint Devices; Crash Injuries; Protection; Head (Anatomy); Product Development

19980003899 Army Aeromedical Research Lab., Fort Rucker, AL USA

Simulations of Head Strikes in Helicopters and the Roles of Restraints, Seat Stroke and Airbags on their Reduction

Alem, Nabih M., Army Aeromedical Research Lab., USA; Beale, David G., Auburn Univ., USA; Mobasher, Amir A., Universal Energy Systems, Inc., USA; Brozoski, Frederick T., Universal Energy Systems, Inc., USA; Nov. 1997; 8p; In English; Also announced as 19980003879; Copyright Waived; Avail: CASI; A02, Hardcopy; A03, Microfiche

Injuries from head strikes remain the leading cause of fatalities in U.S. Army helicopter mishaps. The roles of the restraint system, energy absorbing seat stroke and airbags in preventing or reducing the severity of head strikes are explored in this paper using mathematical simulations. Starting with a baseline simulation of an actual AH-64 survivable mishap in which the pilot received fatal basilar skull injury, the effects of three parameters were examined: timing of inertia reel locking, stroking of the energy absorbing seat, and the presence of an airbag mounted at the instrument panel. Results of the simulations suggested that delay of inertia reel in locking at the appropriate time together with obstruction of seat stroking may have caused the pilot's head to strike the glare shield. When a head strike was unavoidable, simulations indicated that an airbag would have reduced its severity. Author

Air Bag Restraint Devices; Computerized Simulation; Crash Injuries; Damage Assessment; Physiological Effects; Biodynamics

19980003900 BTS Consulting Engineers, Windsor, Ontario Canada

Addressing Front Row HIC Requirements in Commercial Airplanes

McCarthy, J. R., BTS Consulting Engineers, Canada; Yang, K. H., Wayne State Univ., USA; Shanahan, M. T., BTS Consulting Engineers, Canada; King, A. I., Wayne State Univ., USA; Nov. 1997; 6p; In English; Also announced as 19980003879; Copyright Waived; Avail: CASI; A02, Hardcopy; A03, Microfiche

Changes to the Federal Aviation Administration (FAA) regulation regarding occupant crash protection in commercial airplanes has created new design considerations for each occupant position. In particular, addressing front row seating positions to meet the head injury criteria can be a challenging design assignment involving numerous considerations. Various design approaches to meet this requirement are discussed. Particular attention is given to the articulating seat pan approach. Results of prototype testing are presented with recommendations regarding further development.
Author

Commercial Aircraft; Head (Anatomy); Protection; Impact Resistance; Seats; Dynamic Tests

19980003901 General Motors Corp., Safety Research Dept., Warren, MI USA

Investigation of Indy Car Crashes Using Impact Recorders

Melvin, J. W., General Motors Corp., USA; Baron, K. J., General Motors Corp., USA; Little, W. C., General Motors Corp., USA; Pierce, J., General Motors Motorsports, USA; Trammell, T. R., Championship Automobile Racing Teams Safety Team, USA; Nov. 1997; 20p; In English; Also announced as 19980003879; Copyright Waived; Avail: CASI; A03, Hardcopy; A03, Microfiche

This paper describes the initial phases of an ongoing project in the GM Motorsports Safety Technology Research Program to investigate Indy car crashes using an on-board impact recorder as the primary data collection tool. The development of a database consisting of crash investigation data patterned after national highway crash databases is discussed. The data gathered and coded includes track and incident scene information, vehicle damage, and driver injuries, as well as the vehicle decelerations measured by the impact recorder. The paper discusses the development of specifications for the impact device, the selection of the specific recorder and its implementation on a routine basis in Indy car racing. The results from incidents that produced significant data during the 1993, 1994 and 1995 racing seasons are summarized.
Author

Data Acquisition; Data Bases; Automobile Accidents; Data Recorders; Accident Investigation; Impact Damage

19980003902 Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Crash Safety Research Center, Delft, Netherlands

Modelling Head Injury Countermeasures: A 3D Helmet Model

Brands, D. W. A., Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Netherlands; Thunnissen, J. G. M., Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Netherlands; Wismans, J. S. H. M., Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Netherlands; Nov. 1997; 12p; In English; Also announced as 19980003879; Copyright Waived; Avail: CASI; A03, Hardcopy; A03, Microfiche

A three dimensional Finite Element Model of an existing full-face motorcycle helmet mounted on a headform has been developed. Material parameters were obtained from literature data and from component tests. The model is validated by simulating impacts at different locations using the headform acceleration time histories. From this it can be concluded that the headform response is predicted in a realistic way. The simulations showed two phenomena that influence the headform response, i.e. the

behaviour of the material between the headform and the point of impact, and the dynamic response of the outer regions of the outer shell. It is believed that the current model describes most of the phenomena observed during an impact and, therefore, is suitable for future optimization studies. The application of the current model is limited to impacts on a flat anvil at points in the median plane of the headform. Recommendations for further model enhancements will be presented.
Author
Dynamic Response; Helmets; Three Dimensional Models; Crash Injuries; Impact Tests; Computerized Simulation

19980003928 NERAC, Inc., Tolland, CT USA
Protective Clothing: Fire and Radiation Environments. (Latest citations from the NTIS Bibliographic Database)
Nov. 1996; In English; Page count unavailable. Supersedes PB96-855093.
Report No.(s): PB97-851703; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning clothing design, fabrication, and testing for personal protection from exposure to flames and radiation. Citations discuss the treatment of fibers and textiles, testing for physiological tolerances, and methods of decontamination after exposure. Discussed also are user acceptance and proper use of protective clothing by firefighters, nuclear energy personnel, and others.
NTIS
Radiation Protection; Bibliographies; Fire Fighting; Protective Clothing; Fabrication; Textiles; Flammability

19980003932 New York Univ. Medical Center, Occupational and Industrial Orthopaedic Center, New York, NY USA
Effect of VDT Mouse Design on Task and Musculoskeletal Performance
Barr, A. E., New York Univ. Medical Center, USA; Jan. 04, 1997; 7p; In English
Report No.(s): PB97-206239; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

The effects of mouse use on the forearm and wrist were evaluated among occupational groups in a laboratory setting using pertinent musculoskeletal and skill proficiency outcome measures. An alternative mouse was designed that would reduce the risk of forearm and wrist cumulative trauma disorder (CTD). The effect of mouse design on skill acquisition and proficiency was determined in both highly skilled and novice occupational mouse users. The criteria for the design of the mouse input device were presented. The new mouse design was evaluated on the basis of task performance and motor coordination during a period of skill acquisition. The new mouse was designed so that the forearm would be maintained in a position neutral pronation/supination during mouse operation, the wrist would be maintained in a position of neutral radial/ulnar deviation during mouse operation; excursions of the mouse on the work surface would be performed by wrist flexion/extension; and the design would be appropriate for either right or left handed use. The authors note that the synchronization of both task and musculoskeletal performance outcomes permits an integrated method for evaluating computer input devices in general in a way that addresses both health and productivity issues.
NTIS
Musculoskeletal System; Human Performance; Risk; Tasks; Productivity; Forearm; Coordination; Health

19980003943 New York Univ. Medical Center, Occupational and Industrial Orthopedic Center, New York, NY USA
Effect of VDT Mouse Design on CTD Risk and User Skill
Barr, A. E., New York Univ. Medical Center, USA; Oezkaya, N., New York Univ. Medical Center, USA; Nordin, M., New York Univ. Medical Center, USA; Lee, E., New York Univ. Medical Center, USA; Dec. 16, 1996; 6p; In English
Contract(s)/Grant(s): NIOSH-R03-OH-03260
Report No.(s): PB97-206254; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Risk factors present during forearm pronated (FP) mouse use that were associated with the development of forearm and wrist cumulative trauma disorders (CTD) were investigated. A forearm neutral (FN) mouse design eliminated the postural and joint motion risk factors and reduced some of the muscular demands associated with the postural risks. An increase of 5 to 10 degrees in the grip angle of the FN mouse design was proposed so that the mean wrist deviation angle would be offset from neutral by 5 to 10 degrees of ulnar deviation, and movement would oscillate between neutral and 10 to 15 degrees of ulnar deviation. This would reduce the occurrence of high wrist radial deviation angles and lower demands on the extensor carpi radialis longus and brevis muscle, but also it may improve performance. The authors conclude that risk factors for forearm and wrist CTD are attributable to mouse operation.
NTIS
Musculoskeletal System; Wrist; Forearm; Human Factors Engineering; Computer Components

19980004511 Pennsylvania Univ., Dept. of Computer and Information Science, Philadelphia, PA USA
Jack Validation Study ***Final Report***
Azuola, Francisco, Pennsylvania Univ., USA; Badler, Norman I., Pennsylvania Univ., USA; Ho, Pei-Hwa, Pennsylvania Univ., USA; Huh, Sue-Jung, Pennsylvania Univ., USA; Kokkevis, Evangelos, Pennsylvania Univ., USA; Oct. 07, 1996; 142p; In English
Report No.(s): AD-A330143; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

This document presents the details of the construction of the Jack human figure model. It explains the methods used in putting the model together, the data and references employed, as well as other related topics regarding the application of this model within the interactive 3-D environment of Jack.
DTIC
Three Dimensional Models; Human Body

19980004619 National Inst. for Occupational Safety and Health, Cincinnati, OH USA
Elements of Ergonomics Programs. A Primer Based on Workplace Evaluations of Musculoskeletal Disorders
Cohen, A. L., National Inst. for Occupational Safety and Health, USA; Gjessing, C. C., National Inst. for Occupational Safety and Health, USA; Fine, L. J., National Inst. for Occupational Safety and Health, USA; Bernard, B. P., National Inst. for Occupational Safety and Health, USA; McGlothlin, J. D., National Inst. for Occupational Safety and Health, USA; Mar. 1997; 153p; In English
Report No.(s): PB97-144901; DHHS/PUB/NIOSH-97-117; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche

This primer describes the basic elements of a workplace program aimed at preventing Work-related MusculoSkeletal Disorders (WMSDs). Management commitment, worker participation, and training are addressed along with procedures for identifying, evaluating, and controlling risk factors for WMSDs. The text cites NIOSH ergonomics investigations to illustrate practical ways for meeting program needs. The primer includes a 'toolbox,' which is a collection of techniques, methods, reference materials, and sources for other information that can help in program development.
NTIS
Musculoskeletal System; Human Factors Engineering; Safety Factors

19980004620 Hamilton Standard, United Technologies Corp., Windsor Locks, CT USA
Water Processor and Oxygen Generation Assembly ***Final Report***
Bedard, John, Hamilton Standard, USA; Dec. 05, 1997; 149p; In English
Contract(s)/Grant(s): NASA Order H-29387-D
Report No.(s): NASA/CR-97-206459; NAS 1.26:206459; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

This report documents the results of the tasks which initiated efforts on design issues relating to the Water Processor (WP) and the Oxygen Generation Assembly (OGA) Flight Hardware for the International Space Station. This report fulfills the Statement of Work deliverables requirement for contract H-29387D. The following lists the tasks required by contract H-29387D: (1) HSSSI shall coordinate a detailed review of WP/OGA Flight Hardware program requirements with personnel from MSFC to identify requirements that can be eliminated without affecting the technical integrity of the WP/OGA Hardware; (2) HSSSI shall conduct the technical interchanges with personnel from MSFC to resolve design issues related to WP/OGA Flight Hardware; (3) HSSSI will initiate discussions with Zellwegger Analytics, Inc. to address design issues related to WP and PCWQM interfaces.
Derived from text
Spacecraft Equipment; Oxygen Production; Water Treatment; International Space Station; NASA Programs

19980004689 Squeegee Plus Co., Eugene, OR USA
Effect of Squeegee Design on Carpal Tunnel Pressure ***Final Report, 30 Sep. 1995 - 31 Mar. 1996***
Musser, W. H., Squeegee Plus Co., USA; Coulson, C., Squeegee Plus Co., USA; Jul. 23, 1996; 98p; In English
Contract(s)/Grant(s): NIH-1-R43-OH-03357-01
Report No.(s): PB97-162358; No Copyright; Avail: CASI; A05, Hardcopy; A02, Microfiche

A multitask study was conducted in an effort to examine the relationship between squeegee handle designs and their potential impact on carpal tunnel syndrome and other cumulative trauma disorders (CTDs). The study group was composed of screen print workers. Two important factors in determining perceived confort and exertion during the hands on evaluation were handle shape and width. The best performing handle made full contact with the fingers and the palmar surface of the hand with the hand in a somewhat open and relaxed position. The grip was also wider than the industry standard handle. There were 42 participants who had used padded handles; 60% indicated a marked decrease in hand fatigue and 55% indicated a marked decrease in hand pain. A mean carpal tunnel pressure value was calculated for each subject using each squeegee handle. There was a trend for the ergo-

nomic handle designs to reduce carpal tunnel pressure relative to the industry standard design. The authors conclude that an ergonomically shaped squeegee handle with a relatively wide grip may increase comfort and decrease CTDs.
NTIS
Fingers; Handles; Pressure Reduction; Physical Work; Industries

19980004692 NERAC, Inc., Tolland, CT USA
Dehumidifiers: Latest citations from the US Patent Bibliographic File with Exemplary Claims
May 1997; In English
Report No.(s): PB97-860167; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations of selected patents concerning industrial and commercial dehumidifiers. Applications discussed include dehumidifiers used for image forming devices, food storage devices, cryogenic refrigeration systems, patient ventilators, and pollution removal systems. Ultra-high energy efficient and portable dehumidifiers are briefly investigated.
NTIS
Bibliographies; Dehumidification; Air Conditioning Equipment; Cryogenic Cooling

19980005009 Sustainable Design Group, Inc., Gaithersburg, MD USA
ASHRAE 62-1989 Compliance in a Retail Store Using Desiccant Systems ***Final Report, Jul. 1995 - Aug. 1996***
Spears, J. W., Sustainable Design Group, Inc., USA; Judge, J., Sustainable Design Group, Inc., USA; Feb. 1997; 55p; In English
Contract(s)/Grant(s): GRI-5091-246-2318
Report No.(s): PB97-171631; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

This 14-month field monitoring study documented the technical and economic viability of integrating desiccant dehumidification units into a retail store's HVAC system to condition all outside ventilation air requirements of ASHRAE Standard 62-1989. This report summarizes HVAC equipment and building performance criteria for two nearly identical Wal-Mart Supercenters located in Norfolk and Fremont, Nebraska. At the test-site Norfolk facility, two Munters DryCool desiccant units treated all outside air while standard gas-electric rooftop units conditioned re-circulated air only. The standard-design Fremont location served as the control store, where rooftop units treated outside and re-circulated air. Comparative measurements included total-, latent- and sensible-cooling loads, consistency and comfort of store conditions, ventilation air conditions and quantities, gas and electric energy consumption, and a variety of HVAC equipment performance measurements. Data analysis confirmed that integration of desiccant air handlers into store HVAC design improves store conditions, provides greater flexibility to match equipment to loads, lowers operating costs and presents the potential for first-cost savings.
NTIS
Desiccants; Dehumidification; Space Heating (Buildings); Air Conditioning

19980005368 Stanford Univ., Dept. of Electrical Engineering, Stanford, CA USA
ONR Annual Review 1997. Tactile Sensing and Information Processing for Man and Machine Systems ***Annual Report***
Cutkosky, M. R., Stanford Univ., USA; Kovacs, Gregory, Stanford Univ., USA; Howe, Robert, Harvard Univ., USA; Brockett, Roger, Harvard Univ., USA; Sep. 1997; 14p; In English
Contract(s)/Grant(s): N00014-92-J-1887
Report No.(s): AD-A329927; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Haptic interfaces, that apply forces to the fingertips of a human operator, can be classified as grounded or ungrounded. Grounded devices, such as SensAble Devices' Phantom or Immersion's Impulse Engine, are attached to a stationary object such as a desk. When the operator touches a virtual wall, a contact force is applied through the interface, inhibiting further motion. For ungrounded devices a contact force is felt but there is no impediment to motion of the arm. Little prior research has been done on the perceptual effects of displaying contacts with virtual objects using an ungrounded haptic interface. Experiments were conducted at Stanford to compare how accurately subjects could identify contacts with virtual walls using ungrounded versus grounded feedback. Two haptic interfaces were constructed and operated in three modes: with grounded force feedback applied to the wrist, with ungrounded forces applied to the fingertips, and with grounded wrist forces in addition to fingertip forces. Tests were conducted to see how quickly subjects could arrest motion upon sensing contact (measured as virtual boundary penetration) and how accurately they could distinguish among objects of different size.
DTIC
Visual Perception; Man Machine Systems; Virtual Reality

19980005631 Michigan Univ., Center for Construction Engineering and Management, Ann Arbor, MI USA
Ergonomic Analysis of Construction Tasks for Risk Factors for Overexertion Injuries ***Final Report***
Everett, J. G., Michigan Univ., USA; May 06, 1997; 150p; In English
Report No.(s): PB97-207179; UMCEE-TR-96-27; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

Overexertion injuries are the single largest classification of injury in construction, accouting for about 24% of all injuries. Overexertion injuries generally occur as a result of performing a given task as planned. While overexertion injuries are not intentional, the underlying causes of the injuries are built into the prescribed tools and work methods. If the causes can be identified, it should be possible to engineer them out of the work. The objectives of this project are to develop a catalog of construction tasks and to analyze each task as a whole and each step of each task for the presence of seven generic risk factors for overexertion injuries: repetitive exertions, static exertions, forceful exertions, localized mechanical stresses, posture stresses, low temperature, and vibration. Ratings for each risk factor have been made on a three point scale: 1 = insignificant, 2 = moderate, and 3 = high. Virtually every activity has at least one risk factor with a score of 3. of the sixty-five activities, fifty-three has at least one constituent task with at least two risk factors with scores of 3.
NTIS
Physical Work; Injuries; Risk; Industrial Safety; Human Factors Engineering

19980005665 Battelle Memorial Inst., Columbus, OH USA
Maintenance Hazard Simulation: A Study of Contributing Factors ***Final Report, Nov. 1995 - Oct. 1996***
Ianni, John, Armstrong Lab., USA; Clark, Kirby, Battelle Memorial Inst., USA; Blaney, Lynnette, Battelle Memorial Inst., USA; Hale, Robert, Battelle Memorial Inst., USA; Ziolek, Scott, Computer Sciences Corp., USA; Bridgman, Thomas, Computer Sciences Corp., USA; Jan. 1997; 14p; In English
Contract(s)/Grant(s): F33657-91-C-0001; AF Proj. 2940
Report No.(s): AD-A329627; AL/HR-TP-1966-0044; No Copyright; Avail: Issuing Activity (Defense Technical Information Center (DTIC)), Microfiche

This paper develops a foundation for the representation of hazardous conditions for animated maintenance simulation. Specifically, the objective of this study was to furnish methods to calculate and display hazard thresholds in a simulation system called DEPTH (Design, Evaluation for Personnel, Training, and Human Factors). DEPTH allows maintenance procedures to be graphically simulated using three dimensional Human Figure Models (HFM) and computer aided design geometry. by integrating existing equations and data to generate hazardous regions, DEPTH will be able to indicate when a human figure comes too close to an 'unsafe' object. Once the capability is incorporated in DEPTH, it will be possible to develop safer weapon systems and maintenance procedures. This study focused on radiant and contact properties of objects including operating temperature, voltage, and noise as opposed to ambient factors such as arctic or tropical conditions.
DTIC
Hazards; Human Factors Engineering; Electric Potential; Systems Engineering; Safety; Computer Aided Design; Maintenance Training

19980005709 NERAC, Inc., Tolland, CT USA
Protective Clothing: Survival, Aircraft, and Combat Environments (Latest citations from the NTIS Bibliographic Database)
May 1996; In English; Page count unavailable
Report No.(s): PB96-870688; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning design, testing, and evaluation of protective apparel for military and other non-commercial pilots. The citations focus on clothing appropriate to varying climatic and gravitational conditions, combat conditions, and special circumstances of exposure and survival, such as the ocean environment.
NTIS
Bibliographies; Protective Clothing; Flight Clothing; Design Analysis; Performance Tests; Evaluation

59
MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

19980006324 Technische Hogeschool, Dept. of Mathematics and Computing Science, Eindhoven, Netherlands
Prototype of the Numlab Program: A Laboratory for Numerical Engineering
Buskens, J. P. E., Technische Hogeschool, Netherlands; Slob, M. J. D., Technische Hogeschool, Netherlands; Mar. 1996; 51p; In English
Report No.(s): PB97-176317; RANA-96-04; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

In the project, the authors consider iterative methods for solving large systems of linear equations. They have built a prototype program in which they implemented several different sparse matrix structures, an interface for Matlab and some iterative methods from the Templates library for solving equations. An important aspect of this prototype is that it must be user friendly and that it should be relatively easy to add new methods or interfaces to other packages in the future.
NTIS
Object-Oriented Programming; Matrices (Mathematics); Iterative Networks

60
COMPUTER OPERATIONS AND HARDWARE

Includes hardware for computer graphics, firmware, and data processing. For components see 33 Electronics and Electrical Engineering.

19980003937 NERAC, Inc., Tolland, CT USA
Type 2 PCMCIA Cards. (Latest citations from the Computer Database)
Nov. 1996; In English; Page count unavailable. Supersedes PB96-858279.
Report No.(s): PB97-851927; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the design, applications, and markets for type 2 PCMCIA (Personal Computer Memory Card International Association) cards. Type 2 PCMCIA cards include network cards, modems, sound cards, voice cards, GPS systems, and SCSI cards. Citations include product announcements, product evaluations, product trends, tutorials, and buyer's guides.
NTIS
Bibliographies; Design Analysis; Market Research; Evaluation

19980004014 General Electric Co., Saint Petersburg, FL USA
The Mathatron(reg sign) desktop computer/calculator
Buck, W. H., General Electric Co., USA; Sep. 01, 1967; 40p; In English
Contract(s)/Grant(s): DE-AC04-76DP-00656
Report No.(s): GEPP-97001092; DE97-001092; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)); US Sales Only, Microfiche

A description of Mathatron(reg sign) logic is provided and basic rules required for programming are discussed. Several Mathatron(reg sign) programs, developed for statistical, quality control, and engineering use, are included in the appendix. This computer fills the gap between a desk calculator and a computer using a remote terminal in time sharing applications. Since it is modular, more memory and program storage can be added.
DOE
Computers; Memory (Computers); Time Sharing

19980004048 NERAC, Inc., Tolland, CT USA
Fault Tolerant Computer Systems. (Latest citations from the U.S. Patent Bibliographic File with Exemplary Claims)
Nov. 1996; In English; Page count unavailable.
Report No.(s): PB97-851810; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations of selected patents concerning the design of fault tolerant computer and processor systems for use in data communications. Citations describe fault tolerant storage and retrieval, primary and backup computers, primary

and redundant processors, data manipulation, load management, coded data files and networks, cache memory systems, work group servers operating in standby modes, fault detection and correction, and flight critical computer systems.
NTIS
Bibliographies; Hardware; Patents; Design Analysis; Computer Design; Fault Tolerance

19980004065 Department of Agriculture, Rural Utilities Service, Washington, DC USA
Acceptance Tests for Digital, Stored Program Controlled Central Office Equipment
Nov. 07, 1996; 36p; In English
Report No.(s): PB97-192249; USDA/RUS/BULL-1753E-201; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The switching system acceptance tests specified in this bulletin should be made by the Owner or its Engineer before the equipment is placed into service or accepted for final payment. The acceptance test instructions, checklists, and guidance presented in this bulletin are based on the requirements of Part I of RUS Bulletin 1753E-001, 'General Specification for Digital, Store Program Controlled Central Office Equipment (Form 522).' Paragraph references in this bulletin refer to bulletin 1753-001, Part 1, unless specifically stated otherwise. Although this bulletin was developed with new digital switches in mind, much of the material is also applicable for acceptance testing of additions and upgrades.
NTIS
Switching Circuits; Acceptability; Telephones; Pulse Communication

19980004557 NERAC, Inc., Tolland, CT USA
Computer Security and Computer Viruses. (Latest Citations from Conference Papers Index)
Jan. 1997; In English
Report No.(s): PB97-854509; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning computer viruses and methods of computer security. Citations include computer security in telecommunications, defense, healthcare, and law enforcement institutions. Topics also cover legislation, corporate policies, and security in computer networks. The detection and prevention of computer viruses is described. (Contains 50-250 citations and includes a subject term index and title list.)
NTIS
Bibliographies; Computer Information Security; Computer Viruses

19980004584 Sandia National Labs., Albuquerque, NM USA
Hierarchical high-performance storage system Testbed project at Sandia National Laboratories
Haynes, R. A., Sandia National Labs., USA; Jan. 1997; 13p; In English
Contract(s)/Grant(s): DE-AC04-94AL-85000
Report No.(s): SAND-96-1724; DE97-003148; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The Hierarchical High-Performance Storage System (HPSS) Testbed project at Sandia National Laboratories was part of a research collaboration between industry, national research centers, and national laboratories to develop mass storage system software that would scale to meet the capacity and performance required by supercomputer and massively parallel computational environments. This report describes the software that was developed within this collaboration as a result of a cooperative research and development agreement between Sandia National Laboratories and International Business Machines (IBM) Corporation, Government Systems.
DOE
Architecture (Computers); Massively Parallel Processors; Parallel Processing (Computers); Supercomputers

19980004757 Oak Ridge National Lab., TN USA
A multi-channel ADC for use in the PHENIX detector
Emery, M. S., Oak Ridge National Lab., USA; Frank, S. S., Oak Ridge National Lab., USA; Britton, C. L., Jr., Oak Ridge National Lab., USA; Wintenberg, A. L., Oak Ridge National Lab., USA; Simpson, M. L., Oak Ridge National Lab., USA; Ericson, M. N., Oak Ridge National Lab., USA; Young, G. R., Oak Ridge National Lab., USA; Clonts, L. G., Tennessee Univ., USA; Allen, M. D., Tennessee Univ., USA; [1996]; 8p; In English; IEEE Nuclear Science Symposium and Medical Imaging Conference, 2-9 Nov. 1996, Anaheim, CA, USA
Contract(s)/Grant(s): DE-AC05-96OR-22464

Report No.(s): CONF-961123-7; DE97-001341; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

A custom CMOS analog to digital converter was designed and a prototype 8-channel ADC ASIC was fabricated in a 1.2 (mu)m process. The circuit uses a Wilkinson-type architecture which is suitable for use in multi-channel applications such as the PHENIX detector. The ADC design features include a differential positive-ECL input for the high speed clock and selectable control for 11 or 12-bit conversions making it suitable for use in multiple PHENIX subsystems. Circuit topologies and ASIC layout specifics. including power consumption, maximum clock speed, INL. and DNL are discussed. The ADC performed to 11-bit accuracy.

DOE

Analog to Digital Converters; Fabrication; High Speed; Prototypes; Speed Control; Topology

19980005218 NERAC, Inc., Tolland, CT USA

Computer Disasters: Prevention and Recovery. (Latest citations from the INSPEC Database)

May 1997; In English; Page count unavailable. Supersedes PB96-862107.

Report No.(s): PB97-860191; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the failure of computer systems, large and small, and the resulting loss of data critical to the company. Computer disasters can affect all companies that use computers, even though there may be some planning for and expectation of such loss of data. The citations present methods for preventing computer disasters, techniques for recovering from such disasters, and suggestions on what to do in the event a loss occurs. Case studies are presented from actual disaster situations.

NTIS

Bibliographies; Computers; Systems Management; Failure; Backups

19980005265 NERAC, Inc., Tolland, CT USA

Buffer Memories. (Latest citations from the U.S. Patent Bibliographic File with Exemplary Claims)

Feb. 1997; In English; Page count unavailable

Report No.(s): PB97-856033; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations of selected patents concerning the design, fabrication, and control of buffer memories and devices. Citations describe input and output buffers, read and write memories, reconfigurable multi-user systems, direct map and set associative buffers, random access memory, semiconductor memory, and cache buffer memory. Applications include recording/reproducing systems, packet switched networks, optical disk drives, and microelectronic devices.

NTIS

Bibliographies; Claiming; Computer Storage Devices; Fabrication; Microelectronics; Optical Disks

19980005357 NERAC, Inc., Tolland, CT USA

Magnetic Bubble Memories (Latest citations from the INSPEC Database)

May 1996; In English; Page count unavailable

Report No.(s): PB96-870779; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the technology, applications, markets, and future trends for magnetic bubble memories. Some attention is given to comparative evaluations of bubble memory devices and other types of memory devices in the context of anticipated developments. Computer data and mass memory storage applications are discussed.

NTIS

Bibliographies; Computer Storage Devices; Data Storage; Magnetic Storage; Memory (Computers); Bubble Memory Devices

19980005720 NERAC, Inc., Tolland, CT USA

Computer Keyboards: Design, Selection, and Evaluation (Latest citations from the Computer Database)

May 1996; In English; Page count unavailable

Report No.(s): PB96-870399; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning computer keyboard design, selection, evaluation, and classification. Keyboard utility software that allows additional functions to be programmed into specific keystrokes is discussed. Citations also dis-

cuss position and function of number pads, function keys, and cursor movement keys. Concept keyboards, Dvorak keyboards, music keyboards, movable control keys, and keyboards that accept spoken commands are examined.
NTIS
Bibliographies; Data Processing Terminals; Design Analysis; Evaluation; Computer Programs; Computer Components

19980006135 Japan Atomic Energy Research Inst., Center for Promotion of Computational Science and Engineering, Tokai, Japan
Development of the real time monitor system
Kato, Katsumi, Research Organization for Information Science Technology, Japan; Watanabe, Tadashi, Japan Atomic Energy Research Inst., Japan; Kaburaki, Hideo, Japan Atomic Energy Research Inst., Japan; Oct. 1996; 41p; In Japanese
Report No.(s): JAERI-Tech-96-044; DE97-729540; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Large-scale simulation technique is studied at the Center for Promotion of Computational Science and Engineering (CCSE) for the computational science research in nuclear fields. Visualization and animation processing technique are studied and developed for efficient understanding of simulation results. The real time monitor system, in which on-going simulation results are transferred from a supercomputer or workstation to a graphic workstation and are visualized and recorded, is described in this report. This system is composed of the graphic workstation and the video equipment connected to the network. The control shell programs are the job-execution shell for simulations on supercomputers, the file-transfer shell for output files for visualization, and the shell for starting visualization tools. Special image processing technique and hardware are not necessary in this system and the standard visualization tool AVS and the UNIX commands are used, so that this system can be implemented and applied in various computer environments.
DOE
Graphs (Charts); Supercomputers; UNIX (Operating System); Video Equipment; Workstations

19980006146 NERAC, Inc., Tolland, CT USA
Content Addressable Memories (Latest citations from the INSPEC Database)
May 1996; In English; Page count unavailable
Report No.(s): PB96-870845; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning content addressable memory (CAM) devices and systems. CAM-based computer hardware design, neural networks, simulation algorithms, and parallel processors are examined. References include applications in high performance computer systems, fast data compression hardware design, highly parallel operation systems, and high speed process controls. Topics cover high-density CAM, fault tolerant memory repair, design-rule check, fuzzy processors, selective matching, and adaptive self-organizing. Supercomputer design, cruise control for intelligent vehicles, particle detectors, and built-in self-tests are also covered.
NTIS
Computer Storage Devices; Addressing; Bibliographies; Design Analysis; Hardware; Neural Nets; Algorithms; Parallel Processing (Computers); Memory (Computers)

61
COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, algorithms, and specific applications, e.g., CAD/CAM.

19980003909 NERAC, Inc., Tolland, CT USA
Software Security and Piracy (Latest citations from the INSPEC Database)
Nov. 1996; In English; Page count unavailable
Report No.(s): PB97-851265; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the technology of software protection, computer vulnerability, language design techniques, and legal protection. Data security and integrity control, terminal authorization, and security protection mechanisms are considered. Secure transaction processing, disaster planning, and electronic seal and safety coding techniques are included.
NTIS
Bibliographies; Computer Information Security; Programming Languages; Computer Systems Programs; Safety; Security

19980003934 Technische Univ., Delft, Netherlands

Simulation Host Software Requirements Document

vanGool, P. C. A., Technische Univ., Netherlands; Jan. 1996; 32p; In English

Report No.(s): PB97-206098; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The document describes the requirements placed upon the simulator host computer as far as the simulation software is concerned. In the SIMONA Research Simulator Software Requirements Document, the simulator host computer is described as the device which executes the simulation software and controls the connection and communication to the simulation subsystems. The document will mainly focus on the computer's function as simulation host and not on its function as fileserver. In the document, a more elaborate and precise description of entity and environment requirements will be given.

NTIS

Flight Simulators; Distributed Interactive Simulation

19980003945 State Univ. of New York, Dept. of Computer Science, Stony Brook, NY USA

Semantic Theories and Automated Tools for Real-Time and Probabilistic Concurrent Systems ***Final Report, 1 Apr. 1993 - 31 Mar. 1997***

Smolka, Scott A., State Univ. of New York, USA; May 23, 1997; 11p; In English

Contract(s)/Grant(s): F49620-93-I-0250

Report No.(s): AD-A329736; AFOSR-TR-97-0422; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The main objective of this project was to develop new semantic theories and automated tools for real-time and probabilistic concurrent systems; that is, systems of coordinating processes that exhibit behavior of a probabilistic or statistical nature and which must meet real-time constraints. The main results achieved include a new semantic framework for reasoning about the relative reliability of probabilistic systems in different operating environments; an efficient algorithm for checking whether a specification of a real-time concurrent system satisfies a correctness property specified in a real-time temporal logic; and a new model of soft real-time systems that allows users to make rigorous statements about the likelihood with which systems are guaranteed to meet deadlines. A number of these results have been incorporated into the Concurrency Factory verification toolkit. In turn, the Factory has provided a platform for technology transfer with several Long Island companies, including Parker-Hannifin, Reuters America, and Northrop Grumman.

DTIC

Concurrent Engineering; Real Time Operation; Communication; Data Structures

19980003980 Texas Univ., Applied Research Labs., Austin, TX USA

Continuation of Signal Detection Using Polyspectra ***Final Report, 1 Jun. 1991 - 31 Mar. 1997***

Hinich, Melvin J., Texas Univ., USA; Oct. 01, 1997; 5p; In English

Contract(s)/Grant(s): N00014-91-J-1276

Report No.(s): AD-A330136; ARL-TL-SP-97-2; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

Two methods have been developed for detecting and classifying transient signals in a noise background. One uses the third order portmanteau test 1 presented in "Testing for Dependence in the Input to a Linear Time Series Model," Journal of Nonparametric Statistics (1996). The test statistic is a sum of squared bicorrelations where the number of lags used is a function of the sample size. A FORTRAN program that has been written computes the standard second order portmanteau test and the third order test statistic. The second order portmanteau test statistic is the sum of squared correlations of the data in each window for the same number of lags used for the third order statistic. The program also computes the mean, standard deviation, skewness, kurtosis, 6th order cumulant, and range for the data in each window. These statistics along with the portmanteau test statistics are written to a file for graphing. Other summary statistics are computed which helps the user to identify the nature of the transient signals.

DTIC

Background Noise; Signal Detection

19980003985 NERAC, Inc., Tolland, CT USA

Software Fault Tolerance (Latest citations from the INSPEC Database)

Nov. 1996; In English; Page count unavailable

Report No.(s): PB97-851612; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the architecture, development, and implementation of software fault tolerance used in complex computer-based, distributed, and real-time systems. Fault tolerance systems perform automatic detection

and restart of failed processes, checkpointing and recovery of data in memory, replication and synchronization of files, and software rejuvenation. (Contains 50-250 citations and includes a subject term index and title list.)
NTIS
Bibliographies; Fault Tolerance; Software Reliability

19980004058 Tennessee State Univ., Dept. of Mechanical Engineering, Nashville, TN USA
The Study of the Relationship between Probabilistic Design and Axiomatic Design Methodology, Volume 3 ***Final Report***
Onwubiko, Chin-Yere, Tennessee State Univ., USA; Onyebueke, Landon, Tennessee State Univ., USA; Dec. 12, 1996; 232p; In English
Contract(s)/Grant(s): NAG3-1479
Report No.(s): NASA/CR-96-206466; NAS 1.26:206466; No Copyright; Avail: CASI; A11, Hardcopy; A03, Microfiche
Structural failure is rarely a ”sudden death” type of event, such sudden failures may occur only under abnormal loadings like bomb or gas explosions and very strong earthquakes. In most cases, structures fail due to damage accumulated under normal loadings such as wind loads, dead and live loads. The consequence of cumulative damage will affect the reliability of surviving components and finally causes collapse of the system. The cumulative damage effects on system reliability under time-invariant loadings are of practical interest in structural design and therefore will be investigated in this study. The scope of this study is, however, restricted to the consideration of damage accumulation as the increase in the number of failed components due to the violation of their strength limits.
Derived from text
Structural Design; Cumulative Damage; Reliability Analysis; Structural Reliability

19980004073 Carnegie-Mellon Univ., Dept. of Computer Science, Pittsburgh, PA USA
Geometric Tools for Algorithms
Vempala, Santosh, Carnegie-Mellon Univ., USA; Aug. 1997; 85p; In English
Contract(s)/Grant(s): NSF CCR-93-57793
Report No.(s): AD-A329831; CMU-CS-97-167; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche
Our thesis is that a geometric perspective yields insights into the structure of fundamental problems, and thereby suggests efficient algorithms for them. As evidence we develop new geometric models and general-purpose tools for removing outliers from numeric data, reducing dimensionality, and counting combinatorial sets. Then we apply these techniques to a set of old problems to obtain polynomial-time algorithms. These include: (1) learning noisy linear-threshold functions (half-spaces), (2) learning the intersection of halfspaces, (3) clustering text corpora, and (4) counting lattice points in a convex body. We supplement some of our theorems with experimental studies.
DTIC
Algorithms; Models

19980004111 Naval Air Warfare Center, Aircraft Div., Patuxent River, MD USA
NATOPS Tabular Interactive Graphics System User’s Manual
Wright, James M., Jr., Naval Air Warfare Center, USA; Caddy, Michael J., Naval Air Warfare Center, USA; Kobus, David B., Naval Air Warfare Center, USA; Sep. 02, 1997; 43p; In English
Report No.(s): AD-A330474; NAWCADPAX-97-198-TR; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
NAWCAD Patuxent River, Maryland, has periodically been requested by Weapon System Managers to provide engineering data changes to the Chapter 2 Performance Section of the NATOPS Flight Manuals. A part of the requested engineering data can be obtained by using a NATOPS Tabular Interactive Graphics System developed by NAWCAD Patuxent River for use in supporting the revising of aircraft tactical manuals. This report will present a user’s guide for the proper implementation of this graphics system.
DTIC
Computer Graphics; User Manuals (Computer Programs); Military Aircraft

19980004113 Carnegie-Mellon Univ., Dept. of Computer Science, Pittsburgh, PA USA
Operating System Resource Reservation for Real-Time and Multimedia Applications
Mercer, Clifford W., Carnegie-Mellon Univ., USA; Jun. 1997; 177p; In English
Report No.(s): AD-A329837; CMU-CS-97-155; No Copyright; Avail: CASI; A09, Hardcopy; A02, Microfiche
Increases in processor speeds and the availability of audio and video devices for personal computers have encouraged the development of interactive multimedia applications for teleconferencing and digital audio/video presentation among others.

These applications have stringent timing constraints, and traditional operating systems are not well suited to satisfying such constraints. On the other hand, hard real-time systems that can meet these constraints are typically static and inflexible. This dissertation presents an enforced operating system resource reservation model for the design and implementation of predictable real-time programs. Applications can reserve resources based on their timing constraints, and an enforcement mechanism ensures that they do not overrun their reservations. Thus, reserves isolate real-time applications from the temporal properties of other real-time (and non-real-time) applications just as virtual memory systems isolate applications from memory accesses by other applications. In addition, reserves are first class objects that are separated from control abstractions such as processes or threads. Therefore reserves can be passed between applications, and this model extends naturally to distributed systems. Reserves support the development of hard real-time and soft real-time programs, and programming techniques based on reserves illustrate how to use them effectively. An implementation of processor reserves in Real-Time Mach shows that reserved multimedia applications can achieve predictable real-time performance.
DTIC
Design Analysis; Models; Operating Systems (Computers); Real Time Operation

19980004116 University of Southern California, Dept. of Computer Science, Los Angeles, CA USA
Computing with Stochastic Signals ***Final Report, 1 Jan. 1993 - 30 Jun. 1996***
vonderMalsburg, Christoph, University of Southern California, USA; Nov. 25, 1996; 8p; In English
Contract(s)/Grant(s): F49620-93-I-0109
Report No.(s): AD-A329802; AFOSR-TR-97-0423; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

The project had set out to create a computer vision system for the analysis of natural scenes. The system was to split the process into several time scales such that it could later be implemented in parallel hardware (e.g., pixel-parallel, feature-sequential). The PI has fully succeeded in reaching these goals. He has created, tested and published a system that is able to recognize objects (e.g., faces) from freely taken digital images. Recognition is based on stored sample images. Recognition of new object types is possible simply on the basis of new sample images. The system has been extensively tested and optimized, with face recognition from large galleries as test environment. Results have been published. The system is ready for implementation in parallel hardware, such as that developed in the VIGILANTE project by S. Suddarth of BMDO in collaboration with JPL. Due to reduction of funding in the third year the PI has not been able to integrate figure-ground separation in the system.
DTIC
Digital Systems; Stochastic Processes; Computer Vision; Computer Programming

19980004125 Stanford Univ., Dept. of Computer Science, Stanford, CA USA
Communication and Coordination in Multi-Agent Systems: Agent-Oriented Programming and Computational Social Laws ***Final Report, 15 Dec. 1993 - 31 Oct. 1996***
Shoham, Yoav, Stanford Univ., USA; Dec. 06, 1996; 5p; In English
Contract(s)/Grant(s): F49620-94-I-0090
Report No.(s): AD-A329826; AFOSR-TR-97-0359; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

Agent oriented programming was proposed as a high-level programming language, in which a programmer is given the opportunity to communicate with other programs in a uniform, high-level language. Furthermore, the programmer could explicitly represent in the program (or 'agent') the relationship with other program (or 'agent'), including the beliefs about the other agents and the obligations made to them. Our hypothesis was that such 'mental-level' design would provide a powerful abstraction that would enable the analysis and even design of complex distributed systems. In addition to such coordination via high-level modeling and communication, we were interested in global mechanisms that eliminate the need for explicit coordination in the place.
DTIC
Coordination; Programming Languages; Laws; Computer Conferencing

19980004128 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
An Analysis of Early Software Reliability Improvement Techniques
Leonard, John G., Air Force Inst. of Tech., USA; Nordgren, Ric K., Air Force Inst. of Tech., USA; Dec. 1997; 78p; In English
Report No.(s): AD-A329810; AFIT/GSS/LAS/97D-1; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

This research explores early life cycle software reliability prediction models or techniques to predict the reliability of software prior to writing code, and a method for increasing or improving the reliability of software products early in the development life cycle. Five prediction models and two development techniques are examined. Each model is statically analyzed in terms of availability of data early in the life cycle, ease of data collection, and whether data is currently collected. One model and the two tech-

niques satisfied those requirements and are further analyzed for their ability to predict or improve software reliability. While the researchers offer no significant statistical results of the model's ability to predict software reliability, important conclusions are drawn about the cost and time savings of using inspections as a means of improving software reliability. The results indicate that the current software development paradigm needs to be changed to use the Clean room Software Development Process for fixture software development. This proactive approach to developing reliable software saves development and testing costs. One obvious benefit of this research is that cost savings realized earlier in the software development cycle have a dramatic effect on making software development practices better and more efficient.
DTIC
Software Reliability; Life (Durability); Performance Prediction; Qualitative Analysis; Reliability Analysis

19980004136 NERAC, Inc., Tolland, CT USA
Image Enhancement: Latest citations from the INSPEC Database
Jun. 1996; In English, USA; Page count unavailable.
Report No.(s): PB96-858238; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning techniques used to enhance images. Fuzzy set and neural net techniques for enhancing image quality are described. The use of wavelets, various filtering techniques, and genetic algorithms for optimal enhancement are included. Applications of image enhancement in the medical, astronomical, and graphics fields are presented.
NTIS
Bibliographies; Astronomy; Genetic Algorithms; Image Enhancement; Neural Nets; Wavelet Analysis; Image Resolution

19980004148 LNK Corp., Riverdale, MD USA
mist: Multispectral Image Similarity Transformation ***Final Report***
Apr. 1997; 35p; In English; Original contains color illustrations
Contract(s)/Grant(s): NAS5-32357
Report No.(s): NASA/CR-97-203902; NAS 1.26:203902; CON-97-083; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This report describes work intended to aid in the problem of automatically registering two images of dissimilar type. The algorithms implemented in the software attempt to determine a transformation from one image to another. This report also describes: edge extraction; line segment extraction; determination of the rotation parameters; determination of the scale parameters; determination of the translation parameters.
Derived from text
Imagery; Image Correlators; Image Processing; Algorithms; Analogies

19980004153 Tennessee State Univ., Dept. of Mechanical Engineering, Nashville, TN USA
The Study of the Relationship between Probabilistic Design and Axiomatic Design Methodology, Volume 1 ***Final Report***
Onwubiko, Chinyere, Tennessee State Univ., USA; Onyebueke, Landon, Tennessee State Univ., USA; Dec. 12, 1996; 188p; In English
Contract(s)/Grant(s): NAG3-1479
Report No.(s): NASA/CR-97-206464; NAS 1.26:206464; No Copyright; Avail: CASI; A09, Hardcopy; A02, Microfiche

This program report is the final report covering all the work done on this project. The goal of this project is technology transfer of methodologies to improve design process. The specific objectives are: 1. to learn and understand the Probabilistic design analysis using NESSUS. 2. to assign Design Projects to either undergraduate or graduate students on the application of NESSUS. 3. to integrate the application of NESSUS into some selected senior level courses in Civil and Mechanical Engineering curricula. 4. to develop courseware in Probabilistic Design methodology to be included in a graduate level Design Methodology course. 5. to study the relationship between the Probabilistic design methodology and Axiomatic design methodology.
Derived from text
Design Analysis; Mechanical Engineering; Structural Engineering; Technology Transfer

19980004560 National Inst. of Standards and Technology, Applied and Computational Mathematics Div., Boulder, CO USA
Proposed Software Test Service for Special Functions
Lozier, D. W., National Inst. of Standards and Technology, USA; Oct. 1996; 15p; In English
Report No.(s): PB97-159453; NISTIR-5916; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This report provides a proposal to develop a software test service at the National Institute of Standards and Technology for use in testing the accuracy, or numerical precision, of mathematical software for special functions. The service would use the World Wide Web to receive test requests and return test results. It is hoped that such a service will be useful to anyone who uses special functions in physics or other applications, and that it will stimulate the interest of applied mathematicians who are interested in the computation of special functions as well as computer scientists who are interested in innovative uses of the Internet.
NTIS
Errors; Evaluation; Examination; Computerized Simulation

19980004695 Sandia National Labs., Albuquerque, NM USA
Success story in software engineering using NIAM (Natural language Information Analysis Methodology)
Eaton, S. M., Sandia National Labs., USA; Eaton, D. S., Sandia National Labs., USA; Oct. 1995; 11p; In English; Inforum 1996, 24-25 Apr. 1996, Oak Ridge, TN, USA
Contract(s)/Grant(s): DE-AC04-94AL-85000
Report No.(s): SAND-95-2137C; CONF-960466-5; DE96-009786; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

To create an information system, we employ NIAM (Natural language Information Analysis Methodology). NIAM supports the goals of both the customer and the analyst completely understanding the information. We use the customer's own unique vocabulary, collect real examples, and validate the information in natural language sentences. Examples are discussed from a successfully implemented information system.
DOE
Information Systems; Natural Language (Computers)

19980004777 Saclay Research Centre, Gif-sur-Yvette, France
Geometrical primitives reconstruction from image sequence in an interactive context
Monchal, L., Saclay Research Centre, France; Aubry, P., Saclay Research Centre, France; 1995; 8p; In English; 8th; International Conference on Image Analysis and Processing, 13-15 Sep. 1995, San Remo, Italy
Report No.(s): CEA-CONF-12146; CONF-9509437; DE97-620926; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche; US Sales Only; US Sales Only

We propose a method to recover 3D geometrical shape from image sequence, in a context of man machine co-operation. The human operator has to point out the edges of an object in the first image and choose a corresponding geometrical model. The algorithm tracks each relevant 2D segments describing surface discontinuities or limbs, in the images. Then, knowing motion of the camera between images, the positioning and the size of the virtual object are deduced by minimising a function. The function describes how well the virtual objects is linked to the extracted segments of the sequence, its geometrical model and pieces of information given by the operator.
DOE
Three Dimensional Models; Image Processing; Technologies

19980004797 Sandia National Labs., Albuquerque, NM USA
A virtual universe utilizing haptic display
Anderson, T., Sandia National Labs., USA; [1996]; 4p; In English; Phantom User's Group Workshop, 27-30 Sep. 1996, Cambridge, MA, USA
Contract(s)/Grant(s): DE-AC04-94AL-85000
Report No.(s): SAND-96-2838C; CONF-9609299-1; DE97-001386; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

This paper summarizes a virtual reality universe application in which a user can travel between four virtual worlds through the use of haptic buttons. Each of the worlds demonstrates different aspects of haptic rendering which together create a wide base for force feedback effects. Specifics of the rendering algorithms will be discussed along with possible uses and modifications for other real-life applications.
DOE
Computerized Simulation; Virtual Reality; Scientific Visualization; Three Dimensional Models

19980005121 Rochester Univ., Dept. of Computer Science, NY USA
Using Peer Support to Reduce Fault-Tolerant Overhead in Distributed Shared Memories
Hunt, G. C., Rochester Univ., USA; Scott, M. L., Rochester Univ., USA; Jun. 1996; 16p; In English
Contract(s)/Grant(s): N00014-92-J-1801
Report No.(s): AD-A329899; TR-626; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

We present a peer logging system for reducing peformance overhead in fault tolerant distributed shared memory systems. Our system provides fault tolerant shared memory using individual checkpointing and rollback, Peer logging logs DSM modification messages to remote nodes instead of to local disks. We present results for implementations of our fault tolerant technique using simulations of both TreadMarks, a software only DSM, and Cashmere, a DSM using memory mapped hardware. We compare simulations with no fault tolera nce to simulations with local disk logging and peer logging. We present results showing that fault tolerant Treadmarks can be achieved with an average of 17 percent overhead for peer logging. We also present results showing that while almost any DSM protocol can be made fault tolerant, systems with localized DSM page meta-data have much lower overheads.

DTIC
Distributed Memory; Memory (Computers); Protocol (Computers)

19980005133 Aerospace Corp., Engineering and Technology Group, El Segundo, CA USA
SDVS *Final Report, 1994*
Marcus, L. G., Aerospace Corp., USA; Sep. 30, 1994; 31p; In English
Contract(s)/Grant(s): F04701-93-C-0094
Report No.(s): AD-A329901; ATR-94(4778)-3; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The purpose of the State Delta Verification System (SDVS) project is to address some of the inadequacies of the currently popular certification and analysis methods (e.g. testing, simulation, and design walkthroughs) for assuring the correctness of computer systems. This ongoing effort has primarily focused on developing a theoretical framework and software tools for the formal verification of computer systems. SDVS is an automated system to help write and check proofs of the correctness of computer systems with respect to formal specifications.

DTIC
Computers; Program Verification (Computers)

19980005207 Consiglio Nazionale delle Ricerche, Inst. di Analisi dei Sistemi ed Informatica, Rome, Italy
Generalized Production Rules as a Basis for Intergrating Active and Deductive Databases
Palopoli, L., Consiglio Nazionale delle Ricerche, Italy; Torlone, R., Consiglio Nazionale delle Ricerche, Italy; 1994; 23p; In English
Report No.(s): PB96-152582; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

We address the problem of providing a unified linguistic framework for integrating in a database environment active rules, which allow the specification of actions to be executed whenever certain events take place, and deductive rules, which allow the specification of deductions in a logic programming style. In this paper, we present a rule-based language with an event-driven semantics that allows the programmers to express both active and deductive computations. The language is based on a new notion of production rule whose effect is both a change of state and an answer to a query. by using several examples, we show that this simple language schema allows us to uniformly define different computations on data, including complex data manipulations, deductive evaluations and active rule processing. We also describe the architecture of a preliminary implementation of the language.

NTIS
Object-Oriented Programming; Data Base Management Systems; Adaptive Control

19980005236 National Inst. of Standards and Technology, Manufacturing Systems Integration Div., Gaithersburg, MD USA
Industrial Need: Production System Engineering Integration Standards
Mclean, C. R., National Inst. of Standards and Technology, USA; Leong, S. K., National Inst. of Standards and Technology, USA; May 1997; 40p; In English
Report No.(s): PB97-196836; NISTIR-6019; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This document describes the results of Phase I Needs Analysis of the Production Systems Engineering component of the Production and PDM Project within SIMA. It identifies and documents the industry need, technical specifications to be developed,

potential collaborators, and proposed technical approach, a manufacturing scenario for this project. It also describes the relationships between the proposed project, the SIMA Reference Architecture, other projects, and existing standards activities.
NTIS
Production Engineering; Systems Engineering

19980005239 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Calibration and Validation of the Checkpoint Model to the Air Force Electronic Systems Center Software Database
Shrum, Thomas C., Air Force Inst. of Tech., USA; Sep. 1997; 144p; In English
Report No.(s): AD-A329908; AFIT/GCA/LAS/97S-7; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

This research effort focused on the calibration and validation of CHECKPOINT Version 2.3.1, a computerized software cost estimating tool, to the USAF Electronic Systems Center (ESC) software database. This thesis is a direct follow-on to a 1996 CHECKPOINT study at the Air Force Institute of Technology, which successfully calibrated and validated CHECKPOINT to the SMC software database. While this research generally parallels the methodology in the aforementioned study, it offers advancements in the CHECKPOINT calibration and validation procedure, and it refines the data stratification process and the statistical analyses employed. After stratifying the ESC software database into ten usable data sets, the author calibrated and validated the CHECKPOINT model on each data set. Although the results of this study exhibited occasional improvements in estimating accuracy for both the calibration and validation subsets, the model generally failed to satisfy the accuracy criteria used to assess overall calibration success and estimating accuracy (MMRE less than 0.25 and PRED(0.25) greater than 0.75). Thus, the CHECKPOINT model was not successfully calibrated or validated to the 1997 version of the ESC database. The results of this study illuminate the need for complete, accurate and homogeneous data as a requirement for a successful calibration and validation effort.
DTIC
Software Engineering; Computer Programs; Software Reliability

19980005339 Technische Univ., Faculty of Aerospace Engineering, Delft, Netherlands
Frequency Domain Identification of Multivariable State Space Models. Analysis Procedures and User's Guide
Sridhar, J. K., Technische Univ., Netherlands; Soijer, M., Technische Univ., Netherlands; Breeman, J. H., Technische Univ., Netherlands; Mulder, J. A., Technische Univ., Netherlands; Dec. 1996; 240p; In English
Report No.(s): PB97-191787; MEMO-727; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The main object of this study is the development and improvement of multiple input/multiple output algorithms for system identification in the frequency domain and the application to rotorcraft flight-data. In addition, these algorithms are to be implemented in personal computer based software, using MATLAB 4.2 for Windows. to validate the algorithms and the software, an eighth order rigid body model for fully coupled rigid body dynamics of the BO-105 is identified and compared to the results obtained by the members of AGARD working group 18.
NTIS
Algorithms; Rotary Wing Aircraft; BO-105 Helicopter; Computer Programs; System Identification

19980005342 Argonne National Lab., IL USA
Tools for the automatic differentiation of computer programs
Bischof, C., Argonne National Lab., USA; Griewank, A., Argonne National Lab., USA; [1995]; 6p; In English; International Congress on Industrial and Applied Mathematics, 3-7 Jul. 1995, Hamburg, Germany
Contract(s)/Grant(s): W-31-109-eng-38
Report No.(s): ANL/MCS-P-608-0896; CONF-9507214-3; DE97-001991; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

Automatic differentiation (AD) is a methodology for developing sensitivity-enhanced versions of arbitrary computer programs. In this paper, we provide some background information on AD and basic implementation issues for the design of general purpose tools that can deal with codes from the FORTRAN and C family, address some frequently asked questions, and provide pointers for further study.
DOE
Computer Programs; FORTRAN; Automation; Differential Equations; Software Development Tools; Matrices (Mathematics)

19980005343 Newcastle Univ., Dept. of Computing Science, Newcastle, UK
Trade-Off between Cost and Reliability during the Design Phase
Burnett, R., Newcastle Univ., UK; Anderson, T., Newcastle Univ., UK; Nov. 1995; 24p; In English

Report No.(s): PB96-150180; TRS-534; Copyright Waived (NASA); Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The paper proposes a method for estimating the development cost of a software module, taking into account the target level of reliability for that module. The objective is to establish a basis for a model to guide a primary trade-off between cost and reliability during the design phase of the development of a modular software system. The line of argument developed here is that the operational reliability of a software module can be linked to the effort spent during the testing phase a higher level of desired reliability will require more testing effort and, consequently, will cost more. A decomposition technique is used to estimate the cost of development, based on an estimate of the number of faults to be found and fixed in order to achieve the required reliability, using data obtained from the requirement specification and historical data. The proposed model is easy to understand and suitable for use by project managers.

NTIS

Computer Systems Design; Cost Estimates; Reliability

19980005356 Newcastle Univ., Dept. of Computing Science, Newcastle, UK

Using Metaobject Protocols to Satisfy Non-Functional Requirements

Stroud, R. J., Newcastle Univ., UK; Wu, Z., Newcastle Univ., UK; Oct. 1995; 14p; In English

Report No.(s): PB96-150172; TRS-533; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

Traditional approaches to the realization of non-functional requirements such as dependability and distribution transparency are usually not transparent to application programmers and thus increase the complexity of the system. Using a different approach to implement a particular non-functional requirement involves application programmers in making changes to the system. Achieving a clean separation between the implementation of functional and non-functional requirements would reduce the complexity of the final system and thus enhance its maintainability and flexibility. In the paper, the authors presents a metaobject protocol approach to satisfying non-functional requirements that uses meta level programming techniques to make a clean separation between functional and non-functional components, and thus makes it easier to revise the implementation of a particular non-functional requirement in order to meet new demands.

NTIS

Object-Oriented Programming; Computer Systems Design; Fault Tolerance

19980005375 Argonne National Lab., IL USA

Automatic differentiation and numerical software design

Bischof, C. H., Argonne National Lab., USA; [1996]; 11p; In English; 7th; IFIP TC 2 WG2.5 Working Conference, 8-12 Jul. 1996, Oxford, UK

Contract(s)/Grant(s): W-31-109-eng-38

Report No.(s): ANL/MCS-P-606-0896; CONF-9607161-2; DE97-001990; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

Automatic differentiation (AD) tools can generate accurate and efficient derivative code for computer programs of arbitrary length. In some cases, however, the developer of the code to be differentiated may be required to provide additional information to an AD tool to ensure the desired solution. We illustrate these issues with nondifferentiable language intrinsics such as max() in the context of computing the Euclidean norm and numerical integrators. In both cases, very little additional information is required to ensure that AD computes the 'do-what-I-mean' derivatives. In addition, the provision of such information makes it easy to derive 'derivative- enhanced' versions of these codes.

DOE

Software Engineering; Computer Programs; Euclidean Geometry; Differential Equations; Automation

19980005385 Centro de Estudios Aplicados al Desarrollo Nuclear, La Habana, Cuba

Using empirical peak shapes in the analysis of x-ray fluorescence spectra

Lopez Torres, E., Centro de Estudios Aplicados al Desarrollo Nuclear, Cuba; Valdez Fuentes, M., Centro de Estudios Aplicados al Desarrollo Nuclear, Cuba; 1997; 8p; In English

Report No.(s): CIEN-R-4-97; DE97-628847; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche; US Sales Only; US Sales Only

A new code for energy dispersive x-ray spectrometry is presented. The peak area calculation method is based on fitting the multiples using empirical peak shape function. Element identification and several matrix correction procedures are included. Validation and quality assurance of the code results are discussed.
DOE
Spectrum Analysis; X Ray Fluorescence; X Ray Sources; X Ray Spectroscopy

19980005397 Stanford Univ., Dept. of Computer Science, Stanford, CA USA
Parallel ICCG on a Hierarchical Memory Multiprocessor-Addressing the Triangular Solve Bottleneck
Rothberg, E., Stanford Univ., USA; Gupta, A., Stanford Univ., USA; Oct. 1990; 22p; In English
Report No.(s): PB96-151352; STAN-CS-90-1330; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The incomplete Cholesky conjugate gradient (ICCG) algorithm is a commonly used iterative method for solving large sparse systems of equations. In this paper, we study the parallel solution of sparse triangular systems of equations, the most difficult aspect of implementing the ICCG method on a multiprocessor. We focus on shared-memory multiprocessor architectures with deep memory hierarchies. On such architectures we find that previously proposed parallelization approaches result in little or no speedup. The reason is that these approaches cause significant increases in the amount of memory system traffic as compared to a sequential approach. Increases of as much as a factor of 10 on four processors were observed. In this paper we propose new techniques for limiting these increases, including data remappings to increase spatial locality, new processor synchronization techniques to decrease the use of auxiliary data structures, and data partitioning techniques to reduce the amount of interprocessor communication. With these techniques, memory system traffic is reduced to as little as one sixth of its previous volume. The resulting speedups are greatly improved as well, although they are still much less than linear. We discuss the factors that limit further speedups. We present both simulation results and results of experiments on an SGI 4D/340 multiprocessor.
NTIS
Computation; Linear Systems; Memory (Computers); Multiprocessing (Computers); Parallel Processing (Computers)

19980005399 NERAC, Inc., Tolland, CT USA
C++ Object-Oriented Languages (Latest citations from the INSPEC Database)
May 1996; In English; Page count unavailable
Report No.(s): PB96-870829; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the development and assessment of C++ based object-oriented languages. C++ is a powerful compiled language that provides support for object-oriented programming and is suitable for building large complex systems. References examine object-oriented simulators and simulation techniques for computer systems and networks with complex interactions. Topics include C++ compilers, simulation of complex and large systems of moving objects, dynamic visualization of object programs, and C++ class library for object management.
NTIS
C (Programming Language); Bibliographies; Object-Oriented Programming; Computer Networks; Complex Systems; Compilers

19980005599 NERAC, Inc., Tolland, CT USA
Software Copyright Protection (Latest citations from the Computer Database)
May 1996; In English; Page count unavailable
Report No.(s): PB96-869961; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning national and international software copyright protection. Legal issues, laws, and copyright protection acts are discussed. Descriptions of disputes between specific vendors are presented. Legal issues concerning software piracy are covered in another bibliography.
NTIS
Bibliographies; Copyrights; Computer Programs

19980005620 National Defence Research Establishment, Avdelningen foer Ledningssystemteknik, Linkoeping, Sweden
Automatic Generation of a Graphical User Interface with TeleUSE for the Command-Based Data Analysis System Cantor
Automatisk Generering av Grafiskt Anvaendargraenssnitt till Kommandostyrda Dataanalyssystemet Cantor m.h.a. TeleUSE
Mojtahed, V., National Defence Research Establishment, Sweden; Moradi, F., National Defence Research Establishment, Swe-

den; Sep. 1995; 119p; In Swedish
Report No.(s): PB97-101828; F0A-R-95-00172-3.4-SE; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The authors investigated the possibility of using TeleUSE as a means for developing a graphical user interface for Cantor, a data analysis system based on the relational model. The authors have also provided Cantor with a prototype of a graphical user interface in order to verify the authors' theoretical results. In a second Phase of the authors' studies they investigated the possibility of automatically generating a graphical user interface for a command based program like Cantor. The authors have concluded their research by evaluating the rationality of the automation procedure.
NTIS
Data Processing; Graphical User Interface; Computer Graphics; Relational Data Bases

19980005658 Grand Accelerator National d'Ions Lourds, Caen, France
Dynamics of first order phase transitions and stochastic mean field approaches
Jacquot, B., Grand Accelerator National d'Ions Lourds, France; Guarnera, A., Grand Accelerator National d'Ions Lourds, France; Chomaz, P., Grand Accelerator National d'Ions Lourds, France; Colonna, M., Grand Accelerator National d'Ions Lourds, France; 1995; 16p; In English
Report No.(s): GANIL-P-95-12; DE97-626092; No Copyright; Avail: US Sales Only, Microfiche

The dynamics of liquid-gas first-order phase transitions are studied. On the basis of exact numerical simulations performed on a 2D classical gas well inside its spinodal region, it is shown that the early drop formation is dominated by the most unstable zero-sound modes. This allows to simulate the dynamics of the spinodal decomposition using the recently developed stochastic mean-field approaches. Finally, it is discussed how this result can be extended to provide a first microscopic description of the spinodal decomposition of quantum-fluids.
DOE
Computerized Simulation; Phase Transformations; Stochastic Processes; Decomposition; Zero Sound

19980005718 NERAC, Inc., Tolland, CT USA
Application Generators (Latest citations from the INSPEC Database)
May 1996; In English; Page count unavailable
Report No.(s): PB96-870456; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the use of application generators as computer software development tools. Citations discuss application generators used by programmers, systems analysts, and end users in specific environments. The effects on productivity in business and industry are examined.
NTIS
Bibliographies; Computer Programming; Productivity

19980005857 NERAC, Inc., Tolland, CT USA
Computer Integrated Manufacturing: Monitoring and Fault Diagnosis. (Latest citations from the INSPEC Database)
Oct. 1996; In English; Page count unavailable.
Report No.(s): PB97-850184; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning monitoring and fault diagnosis technology used in computer integrated manufacturing (CIM). References discuss flexible manufacturing systems, knowledge-based and online diagnosis, computerized and intelligent monitoring systems, Petri nets, animated graphical simulation, and integrated reliability analysis. CIM system designs for use in electronics, semiconductor manufacturing, automobile, and garment industries are reviewed. (Contains 50-250 citations and includes a subject term index and title list.)
NTIS
Bibliographies; Error Analysis; Computer Aided Manufacturing; Monitors

19980005862 NERAC, Inc., Tolland, CT USA
Handwriting Recognition by Computers: Theory and Fundamentals (Latest citations from the INSPEC Database)
May 1996; In English; Page count unavailable
Report No.(s): PB96-870290; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the fundamentals and theoretical aspects of computer recognition of handwritten characters, words, and signatures. Citations discuss online and interactive recognition, cursive handwriting, signature verification, fuzzy recognition, neural networks, Markov models, and wavelet transforms. Applications in postal automation, law enforcement, computer security, and handwritten forms are examined.
NTIS
Bibliographies; Computer Information Security; Law (Jurisprudence); Signatures; Handwriting; Wavelet Analysis; Computers

19980006139 Woods Hole Oceanographic Inst., Applied Ocean Science and Engineering, MA USA
Transform Texture Classification
Tang, Xiaoou, Woods Hole Oceanographic Inst., USA; Jun. 1996; 167p; In English
Contract(s)/Grant(s): N00014-93-I-0602; N00014-96-I-5028
Report No.(s): AD-A330226; WHOI-97-06; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche

This thesis addresses the three major components of a texture classification system: texture image transform, feature extraction/selection, and classification. For the first component, a unique investigation of texture analysis, drawing on an extensive survey of existing approaches, defines the interrelations among 11 types of texture analysis methods. A novel unification of the different methods defines a framework of transformation and representation in which three major classes of transform matrices capture texture information of increasing coherence length: the spatial domain method (co-occurrence), the micro-structural method (run-length), and the frequency multichannel method (Fourier spectrum). For the second system component, we apply the Karhunen-Loeve Transform (KLT) directly to the transform matrix to extract a vector of dominant features, optimally preserving texture information in the matrix. This approach is made possible by the introduction of a novel Multi-level Dominant Eigenvector Estimation (MDEE) algorithm, which reduces the computational complexity of the standard KLT by several orders of magnitude. Experimental results of applying the new algorithm to the three transform matrix classes show a strong increase in performance. Using the same MDEE algorithm, the three extracted feature vectors are then combined into a more complete description of texture images. The same approach is also us ed for a study of object recognition, where the combined vector also include granulometric, object-boundary, and moment-invariant features. The plankton object recognition experiments use a Learning Vector Quantization (LVQ) neural-net classifier to achieve superior performance on the highly non-uniform plankton database. By introducing a new parallel LVQ learning scheme, the speed of network training is dramatically increased.
DTIC
Image Processing; Neural Nets; Textures; Pattern Recognition; Data Bases; Fourier Transformation; Wavelet Analysis

19980006274 Rutherford Appleton Lab., Dept. for Computation and Information, Chilton, UK
The Design and Use of Algorithms for Permuting Large Entries to the Diagonal of Sparse Matrices
Duff, Iain S., Rutherford Appleton Lab., UK; Koster, Jacko, Rutherford Appleton Lab., UK; Nov. 1997; 12p; In English; Copyright; Avail: Issuing Activity (CLRC, Rutherford Appleton Lab., Chilton, Didcot, Oxfordshire, OX11 0QX, UK), Hardcopy, Microfiche

We consider techniques for permuting a sparse matrix so that the diagonal of the permuted matrix has entries of large absolute value. We discuss various criteria for this and consider their implementation as computer codes. We then indicate several cases where such a permutation can be useful. These include the solution of sparse equations by a direct method and by an iterative technique. We also consider its use in generating a preconditioner for an iterative method. We see that the effect of these reorderings can be dramatic although the best a priori strategy is by no means clear.
Author
Matrices (Mathematics); Algorithms; Permutations; Iterative Solution

19980006282 National Inst. of Standards and Technology, Intelligent Systems Div., Gaithersburg, MD USA
Findings and Recommendations for a Software Development Process
Messina, E., National Inst. of Standards and Technology, USA; Coombs, D., National Inst. of Standards and Technology, USA; Michaloski, J., National Inst. of Standards and Technology, USA; Proctor, F., National Inst. of Standards and Technology, USA; Shackleford, W., National Inst. of Standards and Technology, USA; Mar. 1997; 27p; In English
Report No.(s): PB97-157978; NISTIR-5989; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Researchers in the Intelligent Systems Division (ISD) at the National Institute of Standards and Technology frequently develop software-intensive advanced prototype systems with application in manufacturing and defense. The Software Development Process Project was initiated within ISD to assess the current state of software development practices and to chart a course for improvement. This paper summarizes the findings of the team that was assembled to perform this investigation. Issues dis-

cussed range from development tools and infrastructure to division-wide software life cycle process definition. A brief set of recommendations is presented at the conclusion.
NTIS
Computer Programming; Manufacturing; Software Engineering

19980006300 Computer Sciences Corp., Lanham, MD USA
IUE Data Analysis Software for Personal Computers
Thompson, R., Computer Sciences Corp., USA; Caplinger, J., Computer Sciences Corp., USA; Taylor, L., Computer Sciences Corp., USA; Lawton , P., Computer Sciences Corp., USA; Apr. 11, 1996; 6p; In English
Contract(s)/Grant(s): NAS5-32629
Report No.(s): NASA/CR-97-203903; NAS 1.26:203903; CAN-4121; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

This report summarizes the work performed for the program titled, "IUE Data Analysis Software for Personal Computers" awarded under Astrophysics Data Program NRA 92-OSSA-15. The work performed was completed over a 2-year period starting in April 1994. As a result of the project, 450 IDL routines and eight database tables are now available for distribution for Power Macintosh computers and Personal Computers running Windows 3.1.
Author
Astrophysics; Computer Systems Programs; Data Bases; IUE; Computer Programs

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COMPUTER SYSTEMS

Includes computer networks and special application computer systems.

19980003963 NERAC, Inc., Tolland, CT USA
Massively Parallel Computers. (Latest citations from the INSPEC Database)
Nov. 1996; In English; Page count unavailable.
Report No.(s): PB97-851828; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the architecture, development, and performance of massively parallel computers. References review parallel languages, compilers, algorithms, programming, and processing. Topics include input-output programs, large throughput interconnection, operating system supports, selection operators, vector routing, and computational complexity. Computational applications in physics, chemistry, biology, and engineering are examined.
NTIS
Bibliographies; Hardware; Parallel Processing (Computers); Algorithms; Mathematical Models

19980004122 Illinois Inst. of Tech., Chicago, IL USA
Improving the Quality and Impact of DOD Research Through Enhancement of the Computing Infrastructure at Illinois Institute of Technology ***Final Report, 1 Jun. 1994 - 31 May 1997***
Sep. 15, 1997; 15p; In English
Contract(s)/Grant(s): N00014-94-I-0885
Report No.(s): AD-A330485; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This report describes the projects developed and implemented with support from Grant 'Improving the Quality and Impact of DOD Research through Enhancement of the Computing Infrastructure at Illinois Institute of Technology.' The report covers the period from June 1, 1994 to May 31, 1997. The three years of this project focused on implementing the plans described in the original proposal and improved by a series of faculty Task Forces during the first year of the project under the supervision of a Steering Committee. Regular meetings of the Steering Committee throughout the grant period resulted in the modifications of a number of decisions to better serve the needs of the university in the face of changing conditions. All of the work performed under this grant is described herein in the eleven key topics of the proposal. The DOD funding has allowed IIT to implement many new computer related programs, furnish new laboratories with state-of-the-art equipment, substantially upgrade nearly all existing computer laboratories, and ultimately improve curricula. This funding has also provided extensive campus-wide Ethemet hardware and wiring to all buildings, and combined with the other software and hardware acquisitions, this has allowed IIT to dramati-

cally improve computer and network services to on-campus and remote students and faculty and also to increase ITs presence in community programs and distance learning and research.
DTIC
Computer Networks; Resources Management

19980004579 Patent and Trademark Office, Washington, DC USA
Information Technology Program Recovery Plan (USA Patent and Trademark Office)
Nov. 1995; 56p; In English
Report No.(s): PB96-150974; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche
Topics considered include: System Operations; System Development; Goals, Strategies and Future Directions; and System Development and Maintenance Acquisition.
NTIS
Automation; Information Management; Patents

19980004589 Sandia National Labs., Albuquerque, NM USA
Performance modeling of network data services
Haynes, R. A., Sandia National Labs., USA; Pierson, L. G., Sandia National Labs., USA; Jan. 1997; 15p; In English
Contract(s)/Grant(s): DE-AC04-94AL-85000
Report No.(s): SAND-94-2594; DE97-003147; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche
Networks at major computational organizations are becoming increasingly complex. The introduction of large massively parallel computers and supercomputers with gigabyte memories are requiring greater and greater bandwidth for network data transfers to widely dispersed clients. For networks to provide adequate data transfer services to high performance computers and remote users connected to them, the networking components must be optimized from a combination of internal and external performance criteria. This paper describes research done at Sandia National Laboratories to model network data services and to visualize the flow of data from source to sink when using the data services.
DOE
Bandwidth; Massively Parallel Processors; Parallel Computers; Parallel Processing (Computers); Supercomputers

19980004698 Newcastle-upon-Tyne Univ., Dept. of Computing Science, Newcastle, UK
Fault-Tolerant Group Communication Protocols for Asynchronous Systems
deAraujo Macedo, R. J., Newcastle-upon-Tyne Univ., UK; Sep. 1995; 167p; In English
Report No.(s): PB96-150024; TRS-524; Copyright Waived (NASA); Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche
It is widely accepted that group communication (multicast) is a powerful abstraction that can be used whenever a collection of distributed processes co-operate to achieve a common goal such as load-sharing of fault-tolerance. Due to the uncertainties inherent to distributed systems (emerging from communication and/or process failures), group communication protocols have to face situations where, for instance, a sender process fails when a multicast is underway or where messages from different senders arrive in an inconsistent order at different destination processes. Further complications arise if processes belong to multiple groups.
NTIS
Communication Networks; Fault Tolerance; Synchronism; Computer Networks; Protocol (Computers); Messages; Distributed Processing

19980004828 NASA Lewis Research Center, Cleveland, OH USA
Parallel ALLSPD-3D: Speeding Up Combustor Analysis Via Parallel Processing
Fricker, David M., NASA Lewis Research Center, USA; Jun. 1997; 10p; In English; 33rd; 33rd Joint Propulsion Conference and Exhibit, 6-9 Jul. 1997, Seattle, WA, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA
Report No.(s): AD-A330109; NASA-TM-107489; NAS 1.15:107489; ARL-MR-369; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche
The ALLSPD-3D Computational Fluid Dynamics code for reacting flow simulation was run on a set of benchmark test cases to determine its parallel efficiency. These test cases included non-reacting and reacting flow simulations with varying numbers of processors. Also, the tests explored the effects of scaling the simulation with the number of processors in addition to distributing a constant size problem over an increasing number of processors. The test cases were run on a cluster of IBM RS/60000 Model

590 workstations with ethernet arid ATM networking plus a shared memory SGI Power Challenge L workstation. The results indicate that the network capabilities significantly influence the parallel efficiency, i.e., a shared memory machine is fastest and ATM networking provides acceptable performance. The limitations of ethernet greatly hamper the rapid calculation of flows using ALLSPD-3D.
DTIC
Computational Fluid Dynamics; Parallel Processing (Computers); Computer Systems Programs; Efficiency

19980005379 Newcastle Univ., Dept. of Computing Science, Newcastle, UK
Non-Pure Nets and Their Transition Systems
Pietkiewicz-Koutny, M., Newcastle Univ., UK; Yakovlev, A., Newcastle Univ., UK; Sep. 1995; 19p; In English
Report No.(s): PB96-150123; TRS-528; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

This paper extends the theory of regions within a set-theoretic framework, to accomodate the class of non-pure nets and their transition systems. Those are called semi-elementary nets and semi-elementary transition systems, respectively. The main motivation of such an extension is practical: the need to model asynchronous hardware structures, where certain events happen only when some conditions (these are called co-conditions) are true but without changing the state of these conditions. One of the applications of this theory is synthesis of Petri net models from state-based specifications. As an example, the authors present a Petri net model of control of a counterflow pipeline for Sproull's asynchronous processor. This control was originally specified as a transition system which did not satisfy elementarity axioms of Nielsen, et. al.
NTIS
Petri Nets; Pipelining (Computers)

19980005670 Newcastle Polytechnic, Dept. of Computing Science, Newcastle-upon-Tyne, UK
Management of Object-Oriented Action-Based Distributed Programs, *series*
Buzato, L. E., Newcastle Polytechnic, UK; Sep. 1995; 216p; In English
Report No.(s): PB96-150081; TRS-523; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

This thesis addresses the problem of managing the runtime behavior of distributed programs. The thesis of this work is that management is fundamentally an information processing activity and that the object model, as applied to action-based distribution systems and database systems, is an appropriate representation of the management information. In this approach, the basic concepts of classes, objects, relationships and atomic transition systems are used to form object models of distributed programs. Distributed programs are collections of objects whose methods are structured using atomic actions, i.e., atomic transactions. Object models are formed of two submodels, each representing a fundamental aspect of a distributed program. The structural submodel represents a static perspective of the distributed program, and the control submodel represents a dynamic perspective of it. Structural models represent the program's objects, classes and their relationships. Control models represent the program's object states, events, guards and actions - a transition system. Resolution of queries on the distributed program's object model enable the management system to control certain activities of distributed systems.
NTIS
Distributed Parameter Systems; Information Management; Run Time (Computers); Active Control; Data Processing; Management Information Systems; Object-Oriented Programming

19980006289 San Diego Supercomputer Center, San Diego, CA USA
Intelligent Metacomputing Testbed (Distributed Object Computational Testbed (DOCT)) *Quarterly Report, Jul. - Sep. 1997*
Genetti, Jon, San Diego Supercomputer Center, USA; Moore, Reagan, San Diego Supercomputer Center, USA; Marciano, Richard, San Diego Supercomputer Center, USA; Oct. 13, 1997; 11p; In English
Contract(s)/Grant(s): ARPA Order D570
Report No.(s): AD-A330408; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Distributed Object Computation Testbed (DOCT) has two principal goals: the demonstration of an object computation environment that supports distributed processing of large archived data sets and the demonstration of support for electronic submission and processing of complex documents and patent applications for the U.S. Patent and Trademark Office (USPTO). The infrastructure that is being integrated to create this testbed includes archival storage systems, databases, an object computation system, document management systems, and intelligent agents that support the patent application workflow. The resulting technologies should also apply to the information needs of other agencies, such as the National Science Foundation, the National

Institutes of Health, the Nuclear Regulatory Commission, the Environmental Protection Agency (EPA), the Department of Energy, and the Department of Defense.
DTIC
Data Bases; Defense Program; Distributed Processing; Environment Protection; Management Systems

63
CYBERNETICS

Includes feedback and control theory, artificial intelligence, robotics and expert systems. For related information see also 54 Man/System Technology and Life Support.

19980003910 NERAC, Inc., Tolland, CT USA
Hopfield Neural Networks. (Latest citations from the INSPEC Database)
Nov. 1996; In English; Page count unavailable. Supersedes PB96-856778.
Report No.(s): PB97-851778; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the design, development, evaluation, and applications of Hopfield neural networks. Citations discuss various types of networks, Hopfield models, pattern recognition, image reconstruction and segmentation, optimization and control, and simulation systems. Applications are examined, including power system analysis and control, handwritten character recognition, communications traffic control, travelling salesman problems, speech recognition, and missile guidance.
NTIS
Bibliographies; Artificial Intelligence; Pattern Recognition; Neural Nets

19980004089 Technische Univ., Faculty of Technical Mathematics and Informatics, Delft, Netherlands
Deadbeat Controllability for Structured Linear Systems
vander Woude, J., Technische Univ., Netherlands; Nov. 26, 1996; ISSN 0922-5641; 13p; In English
Report No.(s): PB97-208284; Rept-96-146; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

In this note the authors study structured discrete time systems. The authors assume that they know which entries in the system matrices are nonzero. The authors refer to these entries as free parameters. The authors say that the system is generically deadbeat controllable if it is deadbeat controllable for almost all possible free parameters values. Here deadbeat controllability means that every initial state can be steered to the zero state in a finite number of step by means of an appropriate sequence of controls and for almost all means for all except for those in some proper algebraic variety. In this note the authors present a graph theoretic condition for a structured system to be generically deadbeat controllable.
NTIS
Linear Systems; Graph Theory; Controllability

19980004090 Technische Univ., Delft, Netherlands
Tracking Control of a Piezo-Actuated Translation Stage
Adriaens, J. M. T. A., Technische Univ., Netherlands; Banning, R., Technische Univ., Netherlands; dekoning, W. L., Technische Univ., Netherlands; 1996; ISSN 0922-5641; 23p; In English
Report No.(s): PB97-208292; Rept-96-152; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

Using a Scanning Tunneling Microscope (STM) atomic resolution pictures of a surface can be made. Clearly, the required STM tip displacements are extremely small. Furthermore, high quality pictures require extremely accurate tracking of the reference path. The uncoupled XY stage driven by Piezo Electric Actuators (PEA's) enables sub-angstrom displacements. Position measurements are obtained by means of capacitive sensors. The main problem in controlling the tip movement is the PEA's hysteresis. The authors considered 1-dimensional positioning. In a simple state space model of the translation stage and the PEA, the hysteresis is represented by a differential equation (dynamic hysteresis). The model is applicable for elongations smaller than saturation. The problem of trajectory tracking has been solved by means of input-output linearization and pole-placement. Simulations with system and measurement noise added to the equations show good tracking behavior.
NTIS
Actuators; Electron Microscopes; Electron Tunneling; Hysteresis; Active Control; Piezoelectric Transducers

19980004568 California Univ., Electronics Research Lab., Berkeley, CA USA
Tools for Nonlinear Control Systems Design ***Final Report***
Sastry, S. S., California Univ., USA; Nov. 23, 1997; 126p; In English
Contract(s)/Grant(s): NAG2-243
Report No.(s): NASA/CR-97-206495; NAS 1.26:206495; UCB/ERL-M-97/83; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

This is a brief statement of the research progress made on Grant NAG2-243 titled "Tools for Nonlinear Control Systems Design", which ran from 1983 till December 1996. The initial set of PIs on the grant were C. A. Desoer, E. L. Polak and myself (for 1983). From 1984 till 1991 Desoer and I were the Pls and finally I was the sole PI from 1991 till the end of 1996. The project has been an unusually longstanding and extremely fruitful partnership, with many technical exchanges, visits, workshops and new avenues of investigation begun on this grant. There were student visits, long term.visitors on the grant and many interesting joint projects. In this final report I will only give a cursory description of the technical work done on the grant, since there was a tradition of annual progress reports and a proposal for the succeeding year. These progress reports cum proposals are attached as Appendix A to this report. Appendix B consists of papers by me and my students as co-authors sorted chronologically. When there are multiple related versions of a paper, such as a conference version and journal version they are listed together. Appendix C consists of papers by Desoer and his students as well as 'solo' publications by other researchers supported on this grant similarly chronologically sorted.
Author
Control Systems Design; Nonlinear Systems

19980004571 NERAC, Inc., Tolland, CT USA
Neural Networks: Applications (Latest citations from Conference Papers Index)
Oct. 1996; In English; Page count unavailable
Report No.(s): PB97-850770; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the design and development of neural networks for applications in industries and sciences. Citations discuss applications in earth sciences, medical diagnostics, chemical engineering, systems control, information sciences, and character recognition. (Contains 50-250 citations and includes a subject term index and title list.)
NTIS
Neural Nets; Bibliographies

19980004676 NERAC, Inc., Tolland, CT USA
Advanced Intelligent Networks (AINs). (Latest citations from the INSPEC Database)
Sep. 1996; In English; Page count unavailable.
Report No.(s): PB96-873716; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning artificial intelligence technology for use in the development of advanced telecommunications, service management, and customized service networks. Topics include intelligent architecture, intelligent peripherals, service creation environments, distributed artificial intelligence, advanced wireless communication, and human computer interaction in AINs. Advanced mobile communication, freephone, and universal personal telecommunication are explored. (Contains 50-250 citations and includes a subject term index and title list.)
NTIS
Bibliographies; Communication Networks; Technology Utilization; Artificial Intelligence

19980004719 Sandia National Labs., Albuquerque, NM USA
Use of artificial neural networks for analysis of complex physical systems
Benjamin, A., Sandia National Labs., USA; Altman, B., Sandia National Labs., USA; OGorman, C., Sandia National Labs., USA; Rodeman, R., Sandia National Labs., USA; Paez, T. L., Sandia National Labs., USA; [1996]; 21p; In English; 30th; Annual Hawaii International Conference on System Sciences, 7-10 Jan. 1997, Wailea, HI, USA
Contract(s)/Grant(s): DE-AC04-94AL-85000
Report No.(s): SAND-96-1861C; CONF-970112-2; DE96-014025; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

Mathematical models of physical systems are used, among other purposes, to improve our understanding of the behavior of physical systems, predict physical system response, and control the responses of systems. Phenomenological models are fre-

quently used to simulate system behavior, but an alternative is available - the artificial neural network (ANN). The ANN is an inductive, or data-based model for the simulation of input/output mappings. The ANN can be used in numerous frameworks to simulate physical system behavior. ANNs require training data to learn patterns of input/output behavior, and once trained, they can be used to simulate system behavior within the space where they were trained.They do this by interpolating specified inputs among the training inputs to yield outputs that are interpolations of =Ming outputs. The reason for using ANNs for the simulation of system response is that they provide accurate approximations of system behavior and are typically much more efficient than phenomenological models. This efficiency is very important in situations where multiple response computations are required, as in, for example, Monte Carlo analysis of probabilistic system response. This paper describes two frameworks in which we have used ANNs to good advantage in the approximate simulation of the behavior of physical system response. These frameworks are the non-recurrent and recurrent frameworks. It is assumed in these applications that physical experiments have been performed to obtain data characterizing the behavior of a system, or that an accurate finite element model has been run to establish system response. The paper provides brief discussions on the operation of ANNs, the operation of two different types of mechanical systems, and approaches to the solution of some special problems that occur in connection with ANN simulation of physical system response. Numerical examples are presented to demonstrate system simulation with ANNs.
DOE
Neural Nets; Systems Analysis; Noise; Finite Element Method; Monte Carlo Method

19980004778 Saclay Research Centre, Gif-sur-Yvette, France
Passive hybrid force-position control for tele-operation based on real-time simulation of a virtual mechanism
Joly, L., Saclay Research Centre, France; Andriot, C., Saclay Research Centre, France; 1995; 8p; In English; 7th; International Conference on Advanced Robotics, 20-22 Sep. 1995, Saint Feliu de Guixols, Spain
Report No.(s): CEA-CONF-12145; CONF-9509436; DE97-620925; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche; US Sales Only; US Sales Only

Hybrid force-position control aims at controlling position and force in separate directions. It is particularly useful to perform certain robotic tasks. In tele-operation context, passivity is important because it ensures stability when the system interacts with any passive environment. In this paper, we propose an original approach to hybrid force-position control of a force reflecting tele-robot system. It is based on real-time simulation of a virtual mechanism corresponding to the task. the resulting control law is passive. Experiments on a 6 degrees of freedom tele-operation system consisting in following a bent pipe under several control modes validate the approach.
DOE
Control Theory; Robotics; Robots; Robot Control

19980004902 NERAC, Inc., Tolland, CT USA
Piezoelectric Actuators. (Latest citations from the INSPEC Database)
Oct. 1996; In English; Page count unavailable.
Report No.(s): PB97-850036; Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the design, development, and performance of piezoelectric actuators. References discuss types of actuators and their uses in precision manufacturing and control of micromachines and micro-devices. Topics include optimal control and positioning, linear and nonlinear optimization, vibration control, micromanipulation control, composites analysis, and structural monitoring of aircrafts. (Contains 50-250 citations and includes a subject term index and title list.)
NTIS
Bibliographies; Actuators; Piezoelectricity; Manufacturing

19980005110 Stanford Univ., Dept. of Computer Science, Stanford, CA USA
Randomized Query Processing in Robot Motion Planning ***Topical Report***
Kavraki, L., Stanford Univ., USA; Latombe, J. C., Stanford Univ., USA; Motwani, R., Stanford Univ., USA; Raghavan, P., International Business Machines Corp., USA; Dec. 02, 1994; 18p; In English; Sponsored in part by Schlumberger Foundation and Shell Foundation
Contract(s)/Grant(s): N00014-94-I-0721; N00014-92-J-1809; NSF CCR-93-57849
Report No.(s): PB96-150297; STAN-CS-TR-1533; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The subject of this paper is the analysis of a randomized preprocessing scheme that has been used for query processing in robot motion planning. The attractiveness of the scheme stems from its general applicability to virtually any motion-planning problem, and its empirically observed success. In this paper, we initiate a theoretical basis for explaining this empirical success. Under a simple assumption about the configuration space, we show that it is possible to perform a preprocessing step following

which queries can be answered quickly. En route, we pose and give solutions to related problems on graph connectivity in the evasiveness model, and art-gallery theorems.
NTIS
Trajectory Control; Robot Dynamics; Collision Avoidance

19980005233 Technische Univ., Faculty of Applied Mathematics, Twente, Netherlands
Control of a Super-Articulated Robot Manipulator with Joint Elasticity
Reyhanoglu, M., Technische Univ., Netherlands; Aug. 1996; 11p; In English
Report No.(s): PB97-182695; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This paper studies the problem of controlling a super-articulated robot manipulator with joint elasticity. The primary focus is to exploit the super-articulated nature of the manipulator to mitigate the undesirable effects of elasticity. A control design constraint involving generalized accelerations is first imposed for controlling the mainpulator motion without storing elastic energy. A nonlinear control system formulation is then introduced to describe the constrained manipulator dynamics. It is shown that although the system is not stabilizable to a desired equilibrium configuration using a time-invariant continuous feedback law, it is strongly accessible and small-time locally controllable at any equilibrium. based on these theoretical results, time-invariant discontinuous feedback laws are constructed to asymptotically stabilize the manipulator to a desired configuration without excitation of its elastic degree of freedom.
NTIS
Manipulators; Nonlinear Systems; Robot Arms; Elastic Properties; Degrees of Freedom

19980005615 NERAC, Inc., Tolland, CT USA
Piezoelectric Actuators. (Latest citations from the U.S. Patent Bibliographic File with Exemplary Claims)
Oct. 1996; In English; Page count unavailable.
Report No.(s): PB97-850218; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations of selected patents concerning the design and fabrication of piezoelectric actuators used in automatic vibration control. Citations describe applications in ink jet printers, electric motor control, heat exchangers, engine blade control, aircraft engine noise control, lead inspection, and image recording and reproduction. (Contains 50-250 citations and includes a subject term index and title list.)
NTIS
Bibliographies; Actuators; Piezoelectricity

19980005617 National Defence Research Establishment, Avdelningen foer Ledningssystemteknik, Linkoeping, Sweden
Consequences of a Change of Operating System in a Complex Computer Environment *Konsekvenser av Operativsystembyte i en Komplex Datormiljoe*
Andersson, J., National Defence Research Establishment, Sweden; Jun. 1996; 59p; In Swedish
Report No.(s): PB97-101802; FOA-R-96-00256-3.6-SE; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

FOA's fast direction finding system for frequency hoppers, Snabbpejl 90, currently uses an old real time operating system, VERSAdos. A new operating system, VMEexec, is intended to replace it. All software in the computer system must be adapted to VMEexec. The report evaluates the new operating system with it's development environment to establish if it is powerful enough to replace VERSAdos. The conclusion is that VMEexec meets all requirements except one: Program development can's be done in the target system. Other differences between VMEexec and VERSAdos can be overcome with varying difficulties.
NTIS
Real Time Operation; Operating Systems (Computers); Frequencies; Direction Finding

19980006129 Newcastle-upon-Tyne Univ., Dept. of Computing Science, Newcastle, UK
Routing among Servers with Breakdowns and Retained Queues, *series*
Thomas, N., Newcastle-upon-Tyne Univ., UK; Mitrani, I., Newcastle-upon-Tyne Univ., UK; Sep. 1995; 28p; In English
Report No.(s): PB96-150115; TRS-527; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

Jobs generated by a single Poisson source can be routed through N alternative gateways, modelled as parallel M/M/1 queues. The servers are subject to random breakdowns which leave their corresponding queues intact, but may affect the routing of jobs during the subsequent repair periods. The marginal equilibrium queue size distributions are determined by spectral expansion.

This can be done, at least in principle, for any number of queues. Several routing strategies are evaluated and compared empirically. Numerical results, including optimal routing, are presented and possible generalizations are considered.
NTIS
Queueing Theory; Reliability; Systems Analysis; Maintenance

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NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

19980003931 Technische Univ., Faculty of Aerospace Engineering, Delft, Netherlands
Developments in B2000. A Review of Time-Integration Methods
Volgers, P. T. G., Technische Univ., Netherlands; Apr. 1997; 15p; In English
Report No.(s): PB97-208342; MEMO-792; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The paper summarizes theory of the most important time integration methods for systems of ordinary differential equations, the Newmark methods, and the linear multistep methods, as well as some implementation methods. Also the calculation of stability and convergence for discretized integration methods is discussed.
NTIS
Differential Equations; Finite Element Method; Computer Programs; Time Dependence

19980003942 Technische Univ., Faculty of Technical Mathematics and Informatics, Delft, Netherlands
Dimension of the Set of Rim Perturbations for Optimal Partition Invariance
Greenberg, H. J., Technische Univ., Netherlands; Holder, A. G., Technische Univ., Netherlands; Roos, C., Technische Univ., Netherlands; Terlaky, T., Technische Univ., Netherlands; 1997; ISSN 0922-5641; 18p; In English
Report No.(s): PB97-208243; Rept-96-156; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

Two new dimension results are presented. For linear programs, it is shown that the sum of the dimension of the optimal set and the dimension of the set of objective perturbations for which the optimal partition is invariant equals the number of variables. A decoupling principle shows that the primal and dual results are additive. The main result is then extended to convex quadratic programs, but the dimension relationships are not longer dependent only on problem size. Further, although the decoupling principle does not extend completely, the dimensions are additive, as in the linear case. Furthermore, if a strictly complementary solution exists, all the results are completely analogous to the linear case.
NTIS
Linear Programming; Dimensions; Invariance; Perturbation; Optimization

19980003968 Australian National Univ., Research School of Physical Sciences, Canberra, Australia
Perils of Asymptotics
Dewar, R. L., Australian National Univ., Australia; Nov. 29, 1995; 8p; In English
Report No.(s): ANU-PRL-TP-95/08; DE97-618179; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

A large part of physics consists of learning which asymptotic methods to apply where, yet physicists are not always taught asymptotics in a systematic way. Asymptotology is given using an example from aerodynamics, and a rent Phys. Rev. Letter Comment is used as a case study of one subtle way things can go wrong. It is shown that the application of local analysis leads to erroneous conclusions regarding the existence of a continuous spectrum in a simple test problem, showing that a global analysis must be used. The final section presents results on a more sophisticated example, namely the WKBJ solution of Mathieu equation.
DOE
Asymptotic Methods; Mathieu Function

19980003983 Technische Univ., Faculty of Technical Mathematics and Informatics, Delft, Netherlands
Solving Linear Systems with Low-Rank Updates
Roos, C., Technische Univ., Netherlands; Terlaky, T., Technische Univ., Netherlands; Trafalis, T., Technische Univ., Netherlands; Warners, J. P., Technische Univ., Netherlands; 1996; ISSN 0922-5641; 14p; In English
Report No.(s): PB97-208235; Rept-96-149; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

This note explores how large sparse linear systems with low-rank updates can efficiently be solved. We discuss how this method is related to the widely used Sherman-Morrison formula. The relation with the normal equations and augmented system

approach, used in interior point methods to calculate the search directions, is discussed as well. Finally, we point out how this method can be used to calculate the search direction for Karmarkar's integer programming potential function efficiently.
NTIS
Linear Programming; Optimization; Integers; Linear Systems

19980004096 Technische Univ., Faculty of Technical Mathematics and Informatics, Delft, Netherlands
Fairness and Equity via Concepts of Multi-Criteria Decision Analysis
Lootsma, F. A., Technische Univ., Netherlands; Ramanathan, R., Technische Univ., Netherlands; Schuijt, H., Technische Univ., Netherlands; 1996; ISSN 0922-5641; 19p; In English
Report No.(s): PB97-190433; Rept-96-101; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

The authors briefly discuss principles of fairness and equity in order to incorporate them in a mathematical method for the allocation of benefits or costs (the output) in a distribution problem, on the basis of the effort, the strength or the needs (the input) of the respective parties. Usually, input and output are multi-dimensional, and proportionality seems to be the leading principle. Therefore the authors employ several algorithmic ideas of Multi-Criteria Decision Analysis in order to support the solution of distribution problems, in particular the ideas underlying the Multiplicative AHP which was designed to process ratio information. The authors extend the method in order to cover the principles of progressivity, priority, and parity as well. Two examples, (1) the establishment of the member state contributions to the European Union, and (2) the allocation of seats in the European Parliament to the member states, show that the proposed method produces contributions and allocations with a higher degree of fairness and equity than the solutions adopted so far.
NTIS
Decision Making; Hierarchies

19980004533 Technische Univ., Faculty of Technical Mathematics and Informatics, Delft, Netherlands
Dimensions of Standard Lexicodes
vanzanten, A. J., Technische Univ., Netherlands; Monroe, L., Technische Univ., Netherlands; Lukito, A., Technische Univ., Netherlands; 1996; 36p; In English
Report No.(s): PB97-190557; Rept-96-66; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

In Section 2 of this report, we discuss this well-known Gilbert-Varshamove bound, and in Section 3, we illustrate the above mentioned similarity for standard lexicodes, i.e. lexicodes based on the natural or standard basis of (GF(2))(sup n) which, evidently, is an example of a triangular basis. In Section 4, we drive some approximations for the dimensions of standard lexicodes in the case d = 5, and in Section 5, we generalize these results for d greater than 5.
NTIS
Vector Spaces; Binary Codes; Coding

19980004716 Royal Inst. of Tech., Dept. of Mathematics, Stockholm, Sweden
Representations of the q-Deformed Lie Algebra of the Group of Motions of the Euclidean Plane
Silvestrov, Sergei D., Royal Inst. of Tech., Sweden; Turowska, Lyudmila B., Royal Inst. of Tech., Sweden; Jun. 04, 1997; 41p; In English
Report No.(s): PB97-209118; TRITA-MAT-97-MA-21; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Bounded and unbounded Hilbert space asterisk-Representations of the q-deformed Lie algebra of the group of plane motions are studied for different choices of involutions.
NTIS
Lie Groups; Hilbert Space

19980004755 Sandia National Labs., Albuquerque, NM USA
Finite element model update via Bayesian estimation and minimization of dynamic residuals
Alvin, K. F., Sandia National Labs., USA; [1996]; 27p; In English; 14th; International Modal Analysis Conference, 12-15 Feb. 1996, Dearborn, MI, USA
Contract(s)/Grant(s): DE-AC04-94AL-85000
Report No.(s): SAND-95-1252C; CONF-960238-11; DE97-001387; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

An algorithm is presented for updating finite element models based upon a minimization of dynamic residuals. The dynamic residual of interest is the force unbalance in the homogeneous form of the equations of motion arising from errors in the model's mass and stiffness when evaluated with the identified modal parameters. The present algorithm is a modification and extension

of a previously-developed Sensitivity-Based Element-By-Element (SB-EBE) method for damage detection and finite element model up-dating. In the present algorithm, SB-EBE has been generalized to minimize a dynamic displacement residual quantity, which is shown to improve test- analysis mode correspondence. Furthermore, the algorithm has been modified to include Bayesian estimation concepts, and the underlying nonlinear optimization problem has been consistently linearized to improve the convergence properties. The resulting algorithm is demonstrated via numerical and experimental examples to be an efficient and robust method for both localizing model errors and estimating physical parameters.
DOE
Algorithms; Finite Element Method; Bayes Theorem; Equations of Motion; Mathematical Models; Optimization; Chronology

19980005018 Technische Univ., Faculty of Technical Mathematics and Informatics, Delft, Netherlands
Symmetric Functional and Singular Traces
Dodds, P. G., Technische Univ., Netherlands; dePagter, B., Technische Univ., Netherlands; Semenov, E. M., Technische Univ., Netherlands; Sukochev, F. A., Technische Univ., Netherlands; 1996; 31p; In English; Figures in this document may not be legible in microfiche
Contract(s)/Grant(s): RFFI-95-01-00135
Report No.(s): PB97-208219; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche
The authors study the construction and properties of positive linear functionals on symmetric spaces of measurable functions which are monotone with respect to submajorization. The construction of such functionals may be lifted to yield the existence of singular traces on certain non-commutative Marchinkiewicz spaces which generalize the notion of Dixmier trace.
NTIS
Functionals; Banach Space

19980005131 Army Construction Engineering Research Lab., Champaign, IL USA
The Environmental Assessment and Management (TEAM) Guide: Oregon Supplement *Final Report*
ORourke, Carolyn, Army Construction Engineering Research Lab., USA; Sep. 1997; 640p; In English
Contract(s)/Grant(s): MIPR-953092
Report No.(s): AD-A330112; CERL-SR-96/75-Rev; No Copyright; Avail: CASI; A99, Hardcopy; A06, Microfiche
Environmental assessments help determine compliance with current environmental regulations. The U.S. Air Force, U.S. Army, Defense Logistics Agency (DLA), and Corps of Engineers (Civil Works) have adopted environmental compliance programs that identify compliance problems before they are cited as violations by the U.S. The Guide combines Code of Federal Regulations (CFRs) and management practices (MPs) into a series of checklists that show legal requirements and the specific operations or items to review. TEAM Guide is supplemented by DOD component-specific manuals detailing DOD component regulations and policies. The Oregon Supplement was developed to be used in conjunction with the TEAM Guide, using existing Oregon state environmental legislation and regulations as well as suggested management practices.
DTIC
Environment Management; Environment Protection; Law (Jurisprudence); Logistics; Procedures; Regulations

19980005143 Technische Univ., Faculty of Technical Mathematics and Informatics, Delft, Netherlands
Mode Interactions for a Weakly Nonlinear Beam Equation
Boertjens, G. J., Technische Univ., Netherlands; vanHorssen, W. T., Technische Univ., Netherlands; 1996; 30p; In English; Figures in this document may not be legible in microfiche
Report No.(s): PB97-208227; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche
In this paper, an initial boundary value problem for a weakly nonlinear Rayleigh beam equation is studied. It is shown that the analysis for this problem differs substantially from the analysis for the Rayleigh wave equation. The initial-boundary value problem can be regarded as a simple model describing wind-induced oscillations of flexible structures like suspension bridges or iced overhead transmission lines. Using a two-timescales perturbation method approximations for solutions of this initial-boundary problem are constructed.
NTIS
Boundary Value Problems; Nonlinear Equations; Rayleigh Waves; Differential Equations

19980005228 Newcastle-upon-Tyne Univ., Dept. of Computing Science, Newcastle, UK
Higher-Order Algebra with Transfinite Types
Steggles, L. J., Newcastle-upon-Tyne Univ., UK; Nov. 1995; 26p; In English
Report No.(s): PB96-150255; TRS-541; Copyright Waived (NASA); Avail: Issuing Activity (Natl Technical Information Service

(NTIS)), Microfiche

The authors extend the simple type system of higher-order algebra with transfinite types. The authors present a general model theory for transfinite higher-order algebra including results on the existence and construction of free and initial models, and a sound and complete equational calculus. The authors demonstrate the use of transfinite types for modeling polymorphism by specifying a simple polymorphic functional programming language.

NTIS

Polymorphism; Algebra; Computer Programming

19980005234 Royal Inst. of Tech., Stockholm, Sweden

Global Fourier Integral Operators and Semiclassical Asymptotics

Laptev, A., Royal Inst. of Tech., Sweden; Sigal, I. M., Royal Inst. of Tech., Sweden; Apr. 1997; 27p; In English; Figures in this document may not be legible in microfiche

Report No.(s): PB97-163034; TRITA-MAT-97-MA-17; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

In section 2, the authors introduce the authors main construction and formulate the authors' main theorem. This theorem is proven in Section 3. Modulo is an important classical statement of independent interest, whose proof is given in Section 4. The authors use their construction in Section 5 in order to obtain semiclassical asymptotics of solutions of Schroedinger equation given. In particular, the authors classify the nature of the phase jumps occuring at caustic sets. In Section 6, the authors apply their construction to time-dependent Hamiltonians of a 'quadratic type'. The authors' approach allows us to obtain a precise formula for the fundamental solution of the corresponding Schroedinger equation via an oscillatory integral. In the last section, the authors clarify the nature of the phase shift appearing for the motion in a singular magnetic potential concentrated at the origin.

NTIS

Fourier Analysis; Hamiltonian Functions; Integral Equations; Integrals; Operators (Mathematics); Schroedinger Equation; Theorems; Time Dependence

19980005235 Royal Inst. of Tech., Stockholm, Sweden

Remarks on the Paper of V. Guillemin and K. Okikiolu: 'Subprincipal Terms in Szego Estimates'

Laptev, A., Royal Inst. of Tech., Sweden; Robert, D., Royal Inst. of Tech., Sweden; Safarov, Y., Royal Inst. of Tech., Sweden; Mar. 1997; 8p; In English; Figures in this document may not be legible in microfiche

Report No.(s): PB97-163042; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Let M be a smooth compact manifold without boundary, dim M = d and let A and B be pseudodifferential operators (PsDO) acting in the space L(sup 2)(M) of half-densities on M. The authors assume that A is a positive elliptic PsDO of order 1 and that B is a PsDO of order 0. Denote by a(chi, xi) and b(chi, xi), (chi, xi) is an element of T(sup (star))M/0, the principal symbols of the operators A and B respectively. The spectrum of A is discrete and therefore its spectral projection P(sub lambda), lambda >=0, is an operator of a finite rank.

NTIS

Manifolds (Mathematics); Operators (Mathematics); Symbols

19980005244 Technische Univ., Faculty of Applied Mathematics, Twente, Netherlands

Packing a Bin Online to Maximize the Total Number of Items

Faigle, U., Technische Univ., Netherlands; Kern, W., Technische Univ., Netherlands; Aug. 1996; ISSN 0169-2690; 11p; In English

Report No.(s): PB97-182737; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A bin of capacity 1 and a finite sequence sigma of items of sizes a1,a2... are considered, where the items are given one by one without information about the future. An online algorithm 'A' must irrevocably decide whether or not to put an item into the bin whenever it is presented. The goal is to maximize the number of items collected. A is f-competitive for some function f if n(sup star) sigma f (n(sub A) sigma) holds for all sequencies sigma, where n(sup star) is the (theoretical) optimum and nA the number of items collected by A. A necessary condition on f for the existence of an f-competitive (possibly randomized) online algorithm is given.

NTIS

Algorithms; Fuzzy Systems

19980005248 Royal Inst. of Tech., Dept. of Mathematics, Stockholm, Sweden

Representation for the Spectral Shift Function for Perturbations of a Definite Sign

Pushnitski, A. B., Royal Inst. of Tech., Sweden; Mar. 1997; 19p; In English; Figures in this document may not be legible in microfiche

Report No.(s): PB97-163059; TRITA-MAT-97-MA-07; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Let H, H(sub 0) be a pair of selfadjoint operators whose difference V = H - H(sub 0) is trace-class and has a definite sign. In this case, a new (integral) representation for the Krein spectral shift function of the pair H, H(sub 0) in terms of the spectral characteristics of the boundary values of the operator ((the absolute value of v)(sup 1/2)(H(sup 0) - zeta I)sup -1(absolute value of V)sup 1/2) is obtained. This representation is extended to the case of perturbations V of a definite sign which satisfy some rather broad conditions of the relatively trace-class type. Applications of this result include pointwise estimates for the spectral shift function and sufficient conditions for its continuity.

NTIS

Perturbation; Spectra; Symbols

19980005263 Royal Inst. of Tech., Stockholm, Sweden

Non-Commutative and Commutative Integrability of Generic Toda Flows in Simple Lie Algebras

Gekhtman, M. I., Royal Inst. of Tech., Sweden; Shapiro, M. Z., Royal Inst. of Tech., Sweden; Apr. 1997; 27p; In English; Figures in this document may not be legible in microfiche

Report No.(s): PB97-163141; TRITA-MAT-97-MA-15; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

In this paper, the method of the explicit integration of the Toda equations was extended to the case when evolution takes place on the dual space of the Borel subalgebra of (g). The authors main result is the Toda flows on generic coadjoint orbits in simple Lie algebras are completely integrable.

NTIS

Lie Groups; Measure and Integration

19980005337 Technische Univ., Faculty of Applied Mathematics, Twente, Netherlands

Various Results on the Toughness of Graphs

Broersma, H. J., Technische Univ., Netherlands; Engbers, E. A., Technische Univ., Netherlands; Trommel, H., Technische Univ., Netherlands; Feb. 07, 1997; 16p; In English

Report No.(s): PB97-180269; MEMO-1372; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

Let G be a graph, and let t greater than or equal to 0 be a real number. Then G is t-tough if t-omega (G-S) less than or equal to + the absolute value of S for all S contained in V(G) with omega(G-S) greater than 1, where omega(G-S) denotes the number of components of G-S. The authors discuss how the toughness of (spanning) subgraphs of G and related graphs depends on tau(G), they give some sufficient (degree) conditions implying tau(G) greater than or equal to t, and they study which subdivisions of 2-connected graphs have minimally 2-tough squares.

NTIS

Graph Theory; Hamiltonian Functions; Toughness

19980005338 Technische Univ., Faculty of Applied Mathematics, Twente, Netherlands

Data Driven Rank Tests for Independence

Kallenberg, W. C. M., Technische Univ., Netherlands; Ledwina, T., Polish Academy of Sciences, Poland; Feb. 1997; 33p; In English

Report No.(s): PB97-181408; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

In this paper, new rank tests for testing independence are introduced. The new testing procedures are not only sensitive for grade linear correlation, but also for grade correlations of higher order polynomials. The number of polynomials involved is determined by the data. Model selection is combined with application of the score test in the selected model. The new tests have greater power-stability. Monte Carlo results clearly show this behavior. Theoretical support is obtained by proving consistency of the new tests.

NTIS

Rank Tests; Monte Carlo Method; Polynomials; Nonparametric Statistics

19980006136 Technische Univ., Faculty of Technical Mathematics and Informatics, Delft, Netherlands

Non-Recursive Meta Model for Simple Fragmentation

Bakker, J. A., Technische Univ., Netherlands; 1996; 19p; In English; See also PB95-215448.

Report No.(s): PB97-192652; Rept-96-72; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

The authors introduce a non-recursive metal model and a set of restrictions enabling a distributed DBMS to enforce correctness of conditional fragmentation, provided it is based on single predicates.
NTIS
Fragmentation; Data Base Management Systems; Models

19980006271 Pennsylvania State Univ., Depts. of Computer Science and Engineering and Electrical Engineering, University Park, PA USA
Target Detection Procedures and Elementary Operations for their Parallel Implementation ***Interim Report, 1 Aug. 1997 - 30 Nov. 1998***
Kasturi, Rangachar, Pennsylvania State Univ., USA; Camps, Octavia, Pennsylvania State Univ., USA; Dec. 26, 1997; 20p; In English
Contract(s)/Grant(s): NAG2-1152
Report No.(s): NASA/CR-97-206658; NAS 1.26:206658; CSE-97-021; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
In this writeup, we have described the procedures which could be useful in target detection. We have also listed the elementary operations needed to implement these procedures. These operations could also be useful for other target detection methods. All of these operations have a high degree of parallelism, and it should be possible to implement them on a parallel architecture to enhance the speed of operation.
Derived from text
Target Acquisition; Targets; Position (Location); Detection

19980006291 Technische Univ., Dept. of Computer Science, Twente, Netherlands
General Conservative Extension Theorem in Process Algebras with Inequalities
D'Argenio, P. R., Technische Univ., Netherlands; Verhoef, C., Amsterdam Univ., Netherlands; 1997; 34p; In English
Report No.(s): PB97-204473; CTIT-TR-6-17; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche
The authors prove a general conservative extension theorem for transition system based process theories with easy-to-check and reasonable conditions. The core of this result is another general theorem which gives sufficient conditions for a system of operational rules and an extension of it in order to ensure conservativity, that is, provable transitions from an original term in the extension are the same as in the original system. As a simple corollary of the conservative extension theorem, the authors prove a completeness theorem. The authors also prove a general theorem giving sufficient conditions to reduce the question of ground confluence modulo some equations for a large term rewriting system associated with an equational process theory to a small term rewriting system under the condition that the large system is a conservative extension of the small one. The authors provide many applications to show that their results are useful.
NTIS
Algebra; Structured Programming; Theorem Proving

19980006313 Leiden Univ., Dept. of Mathematics and Computer Science, Netherlands
Numerical Differentiation and Peano Kernel Functions
Tracogna, S., Leiden Univ., Netherlands; Welfert, B., Leiden Univ., Netherlands; 1997; 24p; In English; Figures in this document may not be legible in microfiche
Report No.(s): PB97-185441; TW-97-01; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
The determination of numerical differentiation formulas is reviewed and the behavior of the associated Peano kernel function is investigated. It is shown that this function vanishes at most once within the interval of the points used for the differentiation, a fact which is used to obtain a simple bound on the residual.
NTIS
Linear Operators; Kernel Functions; Numerical Differentiation; Differential Calculus

19980006314 Technische Univ., Faculty of Technical Mathematics and Informatics, Delft, Netherlands
Remark on Van Lieshout and Baddeley's J-Function for Point Processes
Bedford, T., Technische Univ., Netherlands; Vandenberg, J., Technische Univ., Netherlands; 1996; ISSN 0922-5641; 12p; In English; Figures in this document may not be legible in microfiche; See also PB95-127965.
Report No.(s): PB97-192637; Rept-96-70; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche
The empty space function of a stationary point process in R(sup d) is the function which assigns to each r,r greater than 0, the probability that there is no point within distance r of 0. It is natural to ask whether J = 1 implies that the point process is Poisson.

The authors restrict to the one-dimensional case and show that a classical construction by Szasz provides an immediate counterexample. In this example, the interpoint distances are still exponentially distributed. This raised the question whether it is possible to have J = 1 but non-exponentially distributed interpoint distances. The authors construct a point process with J = 1 but where the interpoint distances are bounded.
NTIS
Poisson Density Functions; Stochastic Processes; Probability Theory

65
STATISTICS AND PROBABILITY

Includes data sampling and smoothing: Monte Carlo method; and stochastic processes.

19980004504 Technische Univ., Faculty of Technical Mathematics and Informatics, Delft, Netherlands
Binary Images and Inhomogeneous Tree-Indexed Markov Chains
Dekking, F. M., Technische Univ., Netherlands; Kraaikamp, C., Technische Univ., Netherlands; Schouten, J. G., Technische Univ., Netherlands; 1996; ISSN 0922-5641; 19p; In English
Report No.(s): PB97-208268; Rept-96-144; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

Binary images are produced in large amounts in modern digital society, either directly or derived from grey value or color images. In case one disposes of a large collection of images representing the same object or scene, one would like to talk about a 'typical' image, or more generally view the images as realizations of a 'random' image. A way to accomplish this is to randomize the construction of the corresponding quad tree. A natural manner to randomly label a tree is by tree-indexed Markov chains whose states are labels or colors. This is described in Section 2. In Section 3, we consider the estimation of the parameters of tree-indexed Markov chain from data. In Section 4, we apply this to a data set consisting of 147 CT-scans of transaxial lung-slices.
NTIS
Markov Chains; Pixels; Image Processing; Binary Codes

19980005222 Technische Univ., Faculty of Applied Mathematics, Twente, Netherlands
Testing Bivariate Independence and Normality
Kallenberg, W. C. M., Technische Univ., Netherlands; Ledwina, T., Technical Univ. of Wroclaw, Poland; Rafajlowicz, E., Technical Univ. of Wroclaw, Poland; Aug. 1996; ISSN 0169-2690; 26p; In English
Contract(s)/Grant(s): KBN-350-044
Report No.(s): PB97-182745; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

In many statistical studies, the relationship between two random variable X and Y is investigated and in particular the question whether X and Y are independent and normally distributed is of interest. It is well-known that choosing the number of components in a smooth test is an important issue. Recently, data driven methods are developed for doing this. The resulting new test statistics for testing independence and normality are introduced in this paper. For a very large class of alternatives, including also independent X and Y with nonnormal marginals, consistency is proved. Monte Carlo results show that the data driven smooth test behaves very well for finite sample sizes.
NTIS
Monte Carlo Method; Normality; Random Variables

19980006131 Technische Hogeschool, Dept of Mathematics and Computing Science, Eindhoven, Netherlands
Asymptotics in Order Statistics
Brands, J. J. A. M., Technische Hogeschool, Netherlands; Mar. 1996; 23p; In English
Report No.(s): PB97-176325; RANA-96-03; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Let F be a probability distribution of real numbers with the property that F(t) less than 1 if t is a member of the set of real numbers. In Section 2, the necessary notions of asymptotics are given; results can be found in Section 3. After some preliminaries in Section 4, the results are derived for specific distributions in Sections 5-9.
NTIS
Asymptotic Series; Probability Distribution Functions; Polynomials

66
SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

19980004906 General Accounting Office, Washington, DC USA
Testimony Before the Subcommittee on Aviation, Committee on Transportation and Infrastructure, House of Representatives. National Airspace System: Observations on the Wide Area Augmentation System
Oct. 1997; 22p; In English
Report No.(s): AD-A330131; GAO/T-RCED-98-12; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

In the 1980s, FAA began considering how a satellite based navigation system could eventually replace the ground based system that had long provided navigation guidance to aviation. In August 1995, after years of study and research, FAA contracted with Wilcox Electric to develop WAAS. However, because of concerns about the contractor's performance, FAA terminated the contract in April 1996. In May 1996, the agency entered into an interim contract with Hughes Aircraft. The interim contract with Hughes was subsequently expanded and became final in October 1996. Under the terms of the WAAS development contract, Hughes will deliver an initial operational capability (Phase 1 WAAS) to FAA by April 1, 1999. The original date written into the Wilcox contract was December 1997. Phase 1 WAAS will be able to support the navigation of aircraft throughout the continental USA for all phases of flight through Category I precision approaches. However, the Phase 1 system will not have sufficient redundancy to continue operations in the event of equipment failures and will have to be backed up by FAA'S current ground based system. FAA expects to conclude the operational testing of Phase 1 WAAS in June 1999 and to commission the system by July 15, 1999. to make WAAS capable of serving as a sole means navigation system throughout the USA, FAA plans to expand the system in Pha ses 2 and 3 of the contract. The Phase 3, or full, WAAS is scheduled to be delivered by October 2001 and commissioned in early 2002.
DTIC
Congressional Reports; Hughes Aircraft; National Airspace System; Navigation; Satellite Navigation Systems

19980005137 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Rethinking Strategic Brigade Airdrop
Beaubien, Seth, Air Force Inst. of Tech., USA; Apr. 1997; 72p; In English
Report No.(s): AD-A330287; AFIT/GMO/LAC/97Y-1; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Strategic Brigade A irdrop has been an American force employment method for over fifty years. This paper looks at SBA's viability, now and in the future. A history of SBA analyzes the tragedies and triumphs of SBA over the years. Specifically noted are common threads through history that continue to effect SBA today. Problems within SBA as varied as doctrine, safety, equipment, personnel and acquisition politics signal the need for change. Three alternatives are provided to the present plan to airdrop a brigade size force from C-1 41, C-5 and C-17 aircraft. The first alternative is a response to changing warfighting doctrine and the political realities of battlefield casualties. It involves the shifting from an airdrop to an airland method of troop deployment. The second alternative offers a less expensive aircraft for the personnel portion of the airdrop mission. It provides more mass on the DZ in less time. The last alternative uses a brand new aircraft to deploy troops in a swarm of aircraft landing like helicopters on the DZ. Multiple corridors and many aircraft are used to increase flexibility while decreasing vulnerability over the DZ. This paper rethinks SBA from an 'outside the box' perspective. Its intention is to show weaknesses and vulnerabilities of the present SBA plan, at the same time offering thoughtful solutions to the problem of deploying Army troops from the fort to the DZ.
DTIC
Air Drop Operations; Aircraft Landing; Deployment; Flying Personnel; Helicopters; Personnel; Safety

19980005272 Technische Univ., Faculty of Applied Mathematics, Twente, Netherlands
Pairwise-Bargained Consistency: Relationship between Nucleolus and tau-Value Through an Associated Bimatrix Game
Namekata, T., Technische Univ., Netherlands; Driessen, T. S. H., Technische Univ., Netherlands; Aug. 1996; ISSN 0169-2690; 26p; In English
Report No.(s): PB97-182711; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Firstly, we introduce pairwise-bargained consistency with a reference point, and use as reference points the maxmin and the minmax value within pure strategies of a certain constant-sum bimatrix game, and also the game value within mixed strategies of it. Secondly, we show that the pairwise-bargained consistency with reference point being the maxmin or the minmax value determines the nucleolus in some class of transferable utility games. It is proved that this class of games is exactly the same as the class of games which have nonempty core that is determined only by one-person and (n - 1)-person coalition constraints. We give a sufficient condition which guarantees that the bargaining set coincides with the core in this class of games. Thirdly, we

interpret the tau-vale of a quasibalanced transferable utility game by the pairwise-bargained consistency with reference point being the game value. Finally, by combining the second and the third results, if a transferable utility game in this class is also semi-convex, then the nucleolus and the tau-value are characterized by the pairwise-bargained consistency with different reference points which are given by the associated bimatrix game.
NTIS
Consistency; Contract Negotiation

19980005860 NERAC, Inc., Tolland, CT USA
Systems Analysis/Operations Research Applied to Transportation Systems (Latest citations from the NTIS Bibliographic Database)
May 1996; In English; Page count unavailable
Report No.(s): PB96-869888; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the application of systems analysis and operations research to surface, air, and space transportation systems for both passengers and materials. Consideration is also given to the management of transportation systems and to services and energy requirements related to transportation systems.
NTIS
Bibliographies; Systems Analysis; Operations Research; Transportation; Space Transportation System

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THEORETICAL MATHEMATICS

Includes topology and number theory.

19980005589 Technische Univ., Faculty of Technical Mathematics and Informatics, Delft, Netherlands
Poincare Bifurcations to Invariant Tori in (R sup n)
Sun, J. H., Technische Univ., Netherlands; 1996; ISSN 0922-5641; 23p; In English; Figures in this document may not be legible in microfiche
Report No.(s): PB97-192710; Rept-96-79; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

Consider the time-periodic perturbations of n-dimensional autonomous systems with a family of closed orbits in the phase space. The Poincare bifurcations to the family of invariant tori in the extended space (t,x) are studied, and the conditions, which depend only on the original system, for determining such bifuractions are described. The results are applied to two examples in the three-dimensional phase space.
NTIS
Perturbation; Toruses; Poincare Spheres; Branching (Mathematics)